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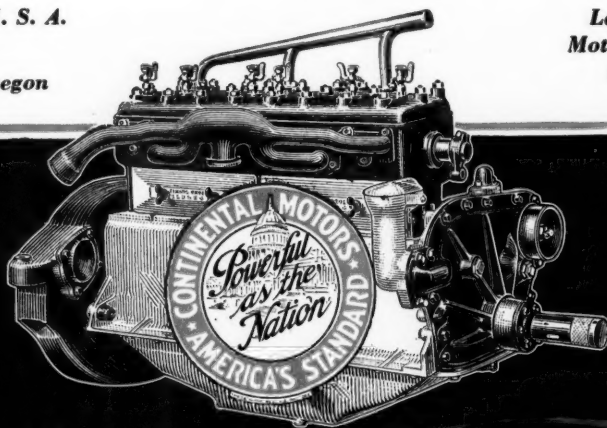
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# AUTOMOTIVE INDUSTRIES

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NEW YORK—THURSDAY, APRIL 27, 1922.

No. 17

## Survey Proves Highway Transport Economic Necessity

Report of Joint Commission of Agricultural Inquiry shows broad vision of future needs. Will recommend promotion of highway construction and maintenance. Urges a correlation of highway transportation with rail and water transportation.

**A**FTER the most comprehensive survey of the distribution and marketing problem ever undertaken in the United States the Joint Commission on Agricultural Inquiry, headed by Representative Sydney Anderson of Minnesota, has completed its report to Congress. One section of the report is devoted to highway transport. The importance of this arm of highway transportation service is given official Congressional recognition for the first time.

While the purpose of the commission, as outlined in its warrant from Congress, was primarily to make a thorough study of the problem of distribution and marketing, its recommendations to Congress, based upon a careful analysis of the enormous mass of data assembled, undoubtedly will carry great weight in framing legislation.

It is significant that the commission, after announcing that "nothing since the advent of railroads has had so marked an economic and sociological effect upon the life of the country as the motor vehicle," will recommend "that Congress promote highway construction and maintenance direct to the more effective correlation of highway transportation with rail and water transportation."

In its survey of the problem before it, which never has been adequately studied in this country, the com-

mission worked back from the ultimate consumer as represented by the retailer, through the wholesaler and the manufacturer to the producer. It obtained specific data on every element of cost from the time agricultural products left the farm until they reached the last station in the point of distribution.

In gathering this information the commission sent out 30,000 questionnaires in which 25,000,000 questions were asked. In analyzing the data more than 50,000,000 calculations were made. This mass of material now has been digested and put together in a formal report.

One striking fact revealed in a digest prepared by Chairman Anderson of that part of the report referring to motor transport is that while motor vehicle traffic increased more than 1900 per cent in the period from 1910 to 1921, the actual expenditure for highway construction and maintenance, taking into consideration the increase in cost of materials and labor, was only slightly over 200 per cent. In his digest Anderson says:

Nothing since the advent of the railroads has had so marked an economic and sociological effect upon the production life of the country as the motor vehicle. The Commission will recommend that Congress continue to promote an adequate program of

highway construction and maintenance, directed to the more effective correlation of highway transportation with rail and water transportation.

Also that the program of highway construction and maintenance by States and counties be continued under the direction of qualified experts, with particular reference to the construction and maintenance of farm-to-market roads; that adequate funds should be appropriated for research and regulation of traffic based upon the facts so ascertained.

Also that the several States co-operate in effecting a uniform basis for taxing motor trucks and other motor vehicles, which shall fairly represent the proportion of expense of highway construction and maintenance chargeable to such vehicles.

Previous to its appearance, the economic zone of transportation was sharply defined by the haulage range of the horse and the cost of such transportation. It will be shown in the report that in 1918 the estimated cost of hauling in wagons from farms to shipping point averaged about 30 cents per ton-mile for wheat, 33 cents for corn and 48 cents for cotton. Hauling in motor truck or by tractors the averages are 15 cents for wheat and corn and 18 cents for cotton. In the same year wagon hauling averaged 9 miles from farm to shipping point and motor truck hauls 11.3 miles; the motor truck averaged 3.4 round trips per day over its longer route, while wagons made 1.2 round trips per day.

It thus appears that the major result accomplished by this new form of transportation has been to extend and broaden the markets of the farmer. Single reactions are to be found in the fact that the use of the motor vehicle has brought the farmer closer to the city and also has increased the desirability and comfort of farm life.

Figures in the report will show that while the motor vehicle traffic has increased more than 1900 per cent in the period 1910 to 1921, the actual expenditures for highway construction and maintenance, taking into consideration the increase in cost of materials and labor during the war and the readjustment period, was only slightly over 200 per cent.

In some sections the combination of inbound farm products and outbound supplies by motor truck has concentrated upon the motor truck service the majority of the traffic within 30, 40 and 50 miles, and the Commission believes that the effect upon rail carriers has been to reduce the amount of local way freight and that ultimately it will reduce the number of local freight trains operated.

"Since the growth in the use of the motor vehicle has been very markedly in advance of highway construction and maintenance," Chairman Anderson said, "and since it has brought with it a new and heavier form of highway traffic, it becomes evident that large funds will have to be expended if the 2,500,000 miles of rural highways in the United States are brought up to the standard of efficiency comparable to the extended use of the roadbeds."

Another effect of improved highways is to enable the farmer to hold his products on the farm for a longer time. Where highways are unimproved the farmer must move his produce when the roads are good, which is gener-

ally at the season when the prices are lowest. Improved highways thus make not only for a broader market but for a more stabilized one.

The Commission believes there should be regulation of the use of the highways, especially with respect to overloading and maximum loading to be based upon the facts so developed. It will also urge that since poor highways not only increase the cost of transportation of commodities from farm to market, but also affect the comfort of the farmer and prevent him and his family from a full enjoyment of communication with his neighbor, all highways wherever possible should be improved and adequately maintained.

It is already clear that there is a wide variation in principle and application of the various State and local regulations affecting intrastate motor traffic. Studies of local motor transportation should be expanded as rapidly as possible to afford a definite and comprehensive basis for uniform regulation of motor transportation in order that the inconvenience, expense and inefficiency of operation occasioned by a lack of uniformity in State and Federal legislation in the future may as far as possible be avoided.

Electric street railways, the Joint Commission has found, have suffered to some extent from the encroachment of the automobile upon their revenues. This competition, which is the first competitive activity to be felt by the street railway, has not seriously affected the revenues except in individual cases, and will not be fatal to their successful operation where these competing forms of transportation

are subject to regulation and control by the proper regulatory bodies. When they are required to assume the same responsibilities as to service rendered and license fees and taxes paid they have not proved to be detrimental to existing transportation agencies.

Viewed in a general way the recommendations reviewed above are of considerable importance to the automotive industry. Sponsored by the powerful farm interests, the recommendations of the Joint Commission of Agricultural Inquiry will shortly be presented to Congress and are likely to be embodied in future legislation.

Thus the industry will note with favor the high tribute paid to the motor vehicle as an essential part of the economic life of American agriculture.

It has long been obvious to students of the question that the motor vehicle is fulfilling a utility function in the conduct of industry and agriculture and that it is an important unit in economic progress. This contention has been justly and strongly made by the automotive industry for some time past.

It is highly useful, however, from a practical standpoint, to have this view of the essential utility value of the motor vehicle so strongly stressed in an impartial and powerful document of this kind.

The report as a whole covers the many economic phases affecting agricultural progress. Digests of the various sections are being published currently. The entire report will probably be ready for publication some time in the near future and can be read with profit by all interested in the subject.

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**H**ERE are some of the chief points brought out in the report: "Nothing since the advent of the railroads has had so marked an economic and sociological effect upon the production life of the country as the motor vehicle."

"The major result of this new form of transportation has been to extend and broaden the markets of the farmer."

"Large funds will have to be expended to bring the 2,500,000 miles of rural highways up to a standard of efficiency comparable to the extended use of roadbeds."

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# Minor Changes in New Packard Single Six

Wheelbase has been lengthened and half inch has been added to stroke of engine. Slight change in carbureter design. Instrument board has been redesigned, and windshield mounting improved. Deeper side rails employed.

**N**O radical engineering changes have been made in the new Packard single six chassis, which was briefly announced in AUTOMOTIVE INDUSTRIES last week. A complete line of bodies is being supplied mounted on two wheelbase lengths of respectively 126 and 133 in. The only alterations of a design character are those intended to take care of the longer wheelbase and the larger body sizes. A half inch has been added to the stroke of the engine, making the bore and stroke now  $3\frac{3}{8}$  by 5 in. The lengthening of the stroke has been accompanied by the use of a lighter, more rigid and more servicable connecting rod. The valve spring retainer shape has been altered, the water pump relocated to add to cooling efficiency under certain operating conditions, the ignition system simplified and some detailed changes have been made in the design of the carbureter. These changes have resulted in a 10 per cent increase in engine output.

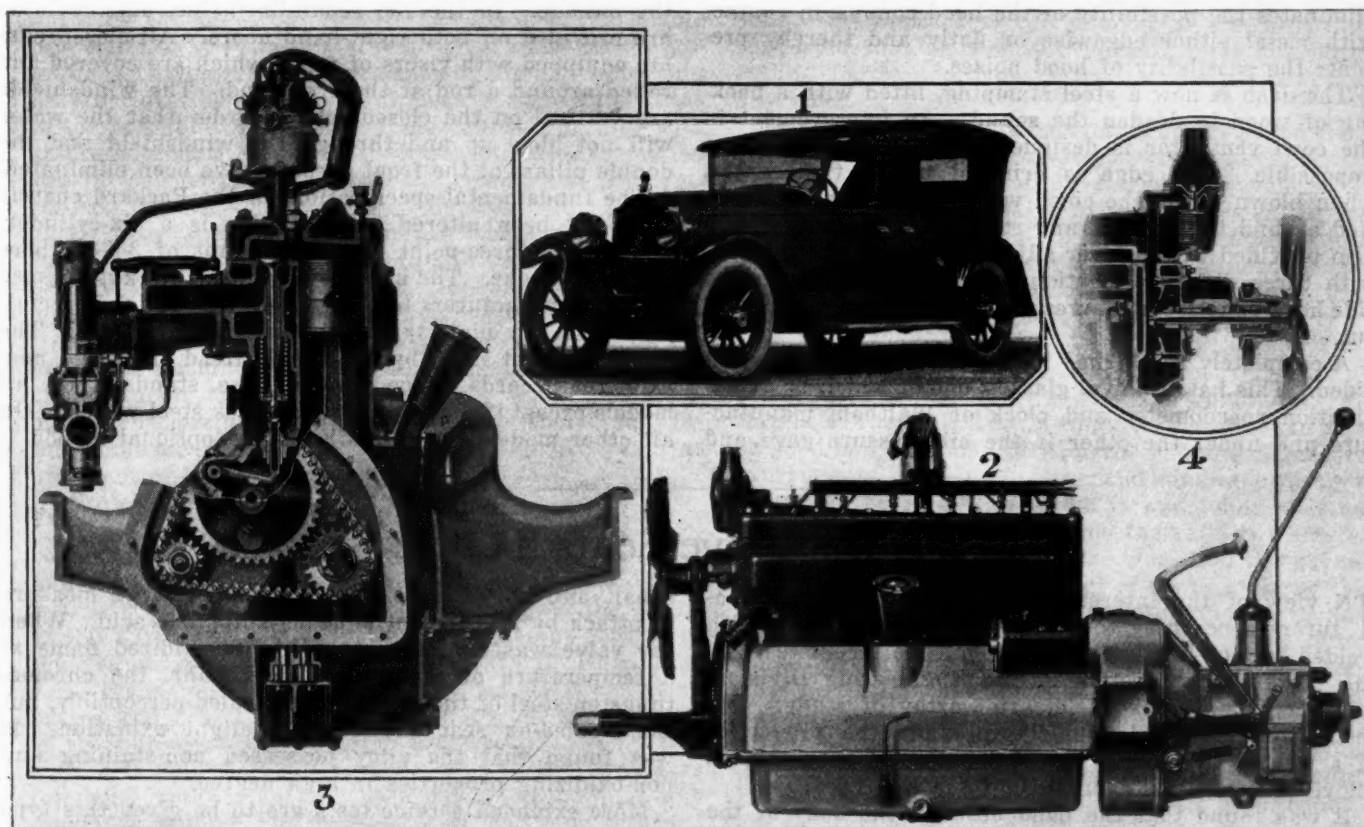
A slight change has been made in the clutch to provide for four driving plates instead of three. The gear ratios are now 4.3 to 1 in the 126-in. wheelbase chassis

and 4.66 to 1 in the 133 in. Both sets of gears are carried in service stock and are interchangeable so that it is possible to use the low gear ratio in the 126-in. wheelbase and the high ratio in the 133 in., if desired.

The relocation of the water pump has made it easy to take off the cylinder head without loosening the radiator, fan, etc., and resulted in a shortening of the fan belt. The engine is now equipped with a new type of fan which gives better efficiency. The outside water pipes have been eliminated and there are only two water hose connections. All of the piping for the deflection of water when the thermostat is closed is cast into the cylinder head and the water outlet manifold is provided for in the bolted-on cover plate.

Other detail engineering changes increase accessibility. The fact that the ignition distributor is now mounted directly on the top permits the cylinder head to come off more readily and the fan and front end chains are readily adjusted from the exterior. The generator mounting is also more accessible.

A chassis change of importance is the greater rigidity



1—Complete car showing improved body lines and lengthened wheelbase. 2—Engine, clutch and gearset unit. 3—Sectional end view of engine. Ignition distributor mounted on top. 4—Cross-section of fan, water pump and thermostat

of the frame side rails. These have been increased in depth to 7½ in. for the 126-in. wheelbase and 8 in. for the 133-in. There is a new front cross member designed to provide for greater rigidity in the front end of the frame and to furnish a more substantial support for the radiator while improving the front end appearance.

There are a great many detail changes for both appearance and quietness, as well as accessibility. A simplified system of conduits and junction boxes has improved the electrical installation and, concealing the cables on the inner dash surface, adds to both appearance and protection. An enameled sheet steel container makes the storage battery more accessible and secure. An improvement has been made in the exhaust system. The vibration set up by the pulsating gases in the exhaust system has been eliminated by the more rigid system of bracketing in a specially designed outlet fitting. The gasoline tank has been redesigned to locate the filler cap on the left side. When the tank is full this location prevents leakage of fuel due to the crown of the road.

A number of detail changes are apparent on the exterior of the car and are designed to improve appearance or to provide greater convenience for driver and passengers. The new type radiator has a nickel plate shell with a convex front surface which relieves the severity of the sharp corners. The radiator is mounted differently. Heretofore, it has been set on built-up pedestals which are now done away with and the front end cross member is so shaped that the radiator frame rests directly on it. This adds to the stiffness of the front end of the frame and the same time providing a more rugged mounting for the radiator.

A new feature has been added in the hood rest, both on the radiator and at the cowl. The fabric is placed some distance under the hood so that a little space is provided both at the radiator shell and the cowl. This eliminates the possibility of the hood coming in contact with metal either edgewise or flatly and thereby prevents the possibility of hood noises.

The dash is now a steel stamping, fitted with a backing of wood to deaden the sound. An improvement in the cowl ventilator is designed to make water leakage impossible. The edge is crimped up so that water, when blown up on the cowl, will not enter, but be carried around to the back and run off. The ventilator is also provided with a lever adjustment on a tight spring, with three different locations for adjustment. On the side hood panels, the louvres are cut in instead of pressed out.

A completely redesigned instrument board is now provided. This has two oval glasses, one of which is a combination speedometer and clock of Waltham manufacture and under the other is the oil pressure gage and

ammeter. The switch is just to the left of these two ovals and the dash light is operated with a separate button on the top of the switch. An improvement has been made in the windshield mounting. Rubber pads have always been provided to prevent leakage around the windshield base, but on the new cars these are improved by the use of a rubber pad that runs completely under the lower half of the windshield and is entirely made in one piece. The lower portion of the windshield does not move and is also equipped with rubber fillers. The doors on all models are now made flush so that there will be no overlapping moldings to break the body line. The inside door handles on the new cars are so designed as to unlock the door by either an up or down motion. The rear end of the muffler pipe is now equipped with a nozzle which is flattened out in such a way that the exhaust will not strike the ground, sidewalk nor the spare tire. This nozzle is connected by a rod to the spare tire rack to make it solid. The irons for supporting the top when down are not visible when the top is up. They fit into sockets in the body which are hidden by the gypsy curtains when the top is up.

A complete line of open and closed bodies is provided on these two chassis. On the 126-in. chassis are mounted the five-passenger touring, two-passenger roadster, four-passenger coupe, five-passenger sedan and four-passenger sport. On the 133-in. chassis are the seven-passenger touring, seven-passenger sedan and seven-passenger sedan-limousine.

On the inside of all of the doors on the closed car models is a cloth loop which is set in the doors to use for closing it from the inside. The window regulators on the doors of the sedans and on the coupes are moved forward to be out of the way. In all sedan models the robe rail is made of tubular braided cloth. All except the right front doors are equipped with inside locks, so that it is only necessary to lock the right front door from the outside. In the 133 sedan-limousine, outside locks are provided on both right-hand doors. All closed cars are equipped with visors of metal which are covered and rolled around a rod at the front end. The windshields are vertical on the closed jobs in order that the water will not blow up and through the windshield and the double pillars at the front corners have been eliminated.

The fundamental specifications of the Packard chassis have not been altered. The engine is a six-cylinder, block cast, three-point suspension unit of 3⅜-in. bore and 5-in. stroke. The horsepower on the block is claimed by the manufacturers to be over 54. The clutch is a multiple disk, dry plate type with four driving plates. The tire equipment is 33 by 4½-in. rib tread front and non-skid rear, cords. Wood wheels are standard on all models except the sport, which use disk steel wheels. On all other models the disk wheels are optional at \$35.

## Welded Valve Seats Tested

**I**N view of the interest among automobile manufacturers concerning the use of alloy steel valves with welded seat of heat-resisting alloy, some recent tests by the Power Plant Section of the Engineering Division, Air Service, McCook Field, are worthy of study. The tests were made particularly to study the properties of a welded valve seat, the seat being a cobalt-chrome alloy. The valve is a product of the Rich Tool Co.

It was found that the bond between the body of the valve and the material is satisfactory and should withstand severe service conditions. It was also found that the welded-on seat material, which is an alloy mainly of

cobalt and chromium, is resistant in a large measure to attack by 20 per cent aqueous sulphuric acid. When the valve was subjected to a highly oxidized flame at a temperature of about 1350 deg. Fahr. the chromium steel of the valve proper scaled perceptibly, but the welded-on seat showed only slight oxidation. It was found that the alloy possessed non-staining and non-oxidizing properties in high degree.

More extended service tests are to be given this type of valve and the expectations are that it will prove out satisfactorily. Metallographic studies showed a very satisfactory structure at the weld.



# Gear Makers' Convention of Much Technical Interest

Papers presented on good hob practice, use of the projection comparator in testing gear teeth, proportion of industrial gears, the grinding of gear teeth and a new system of bevel gears. Definite progress made in standardization work by the American Gear Manufacturers Association.

By P. M. Heldt

THE Sixth Annual Convention of the American Gear Manufacturers' Association, held at the Lafayette Hotel, Buffalo, April 20-22, was well attended and disposed of a well-rounded program. President Sinram in his opening address said that perhaps never before in the memory of anyone present had business been so sorely tried as during the past year. During the depression, which now fortunately seemed to be passing, old and seemingly well established firms had tottered and fallen, and fortunes had been lost. In many fields of industry a housecleaning was absolutely necessary. The gear industry presented a firm front, although it might show a dent here and there. He did not like to strike a pessimistic note, as he was naturally an optimist, but it was necessary to look facts in the face. He expected a gradual and steady improvement during the current year. No lasting prosperity could be looked for until the volume of our exports had assumed reasonable proportions. A definite start had been made on the upgrade in business, but the demands of the new era would be exacting. There had never been a time when those in the same field of industry could counsel together with as much profit as at present. Hereafter the Association should look particularly after the commercial problems confronting the gear industry. By stabilizing their industry they would help to stabilize business in general.

Mr. Sinram made reference to two group meetings to be held during the convention to consider business conditions in the industrial and automotive fields respectively. He thanked the chairman and members of the executive committee and all other committees for their efforts during the past year which, he said, had been a most trying period, and also thanked the membership for the confidence reposed in him during his five years as president of the Association.

## Tariff, Public Relations and Public Policy

During the session on Thursday morning reports of numerous committees were received and several new members elected. S. L. Nicholson presented the report of the Tariff Committee, in which he gave an outline of the present situation with regard to tariff legislation. J. B. Foote reported for the Industrial Relations Committee and advocated the adoption by the membership of an apprenticeship system in order to train competent help. He said that during the war and the two years following many men had been taken on without any previous training, but most of these had now returned to the farms or to other forms of common labor, and already a dearth of skilled help was felt in several of the most important industrial districts. Mr. Foote said

that they all knew of the difficulty in getting a good all-around machinist and that this was largely due to the fact that there was no regular apprenticeship system in this country. Mr. Sawtelle, who had attended the meeting of the National Metal Trades Association in New York during the early part of the week, said that much consideration had been given by that Association to the apprenticeship problem and that six different systems had been worked out and were now being investigated. It was therefore decided to co-operate with the National Metal Trades Association in this matter.

Henry E. Eberhardt reported for the Public Policy Committee. He said that some concerns still adhered to the policy of providing their machines with screws and gears of non-standard pitch, their reason being that by so doing they expected to establish a monopoly on the supply of repair parts. Mr. Eberhardt said that this policy was opposed to the interest of the user, and he suggested that all members educate their customers to calling for standard gears when ordering machines of any kind.

From the report of the secretary it developed that the Association now has 94 member companies, with 109 executive members and 53 associate members. The Automotive Gear Works at Atlanta, Ga., and the Willys-Morrow Co. of Elmira, N. Y., are new member companies admitted at the convention, and additional associate members from the Westinghouse and General Electric companies were also elected.

## Good Hob Practice

During the morning session on Thursday H. E. Harris, of the H. E. Harris Engineering Co., read a paper on good hob practice. Mr. Harris' paper was based upon experiments made with lathe and similar cutting tools about ten years ago in which it was found that better results are obtained as regards the rate at which stock is removed, the accuracy of the work and the durability of the cutting edge if the tool is given a "hook" and a "rake." These principles were later applied to milling tools and to hobs for cutting gears and splines and were found to work out equally well in these lines. Heretofore the teeth of hobs have been generally made with the forward side radial, but it is found that if this face is given a slight angle with relation to the radial plane to the cutting edge, the cutting qualities are improved. Exactly what this angle should be for best results has not yet been determined. In the discussion of this paper it was brought out that in making hobs allowance must be made in the outline of the cutter for the "hook" and the "rake," as otherwise the tooth shape will not be

correct. Mr. Buckingham pointed out in this connection that it is very difficult to determine the modification required. Mr. Flanders said that the amount of the "hook" should be stamped on the hob, as otherwise the operator, when grinding the hob, had nothing to guide him and the angle would increase or decrease after repeated grindings. Mr. Harris said that the same thing applied to hobs with radial teeth.

### Standardization Work

At the afternoon session Ralph E. Flanders, of the Jones & Lamson Machine Co., presented a paper on "The Use of the Projection Comparator in Testing Gear Teeth," which was accompanied by a demonstration of the device. We expect to print Mr. Flanders' paper in an early issue of AUTOMOTIVE INDUSTRIES. Following this, B. F. Waterman, chairman of the General Standardization Committee, first presented the report of the Sectional Committee on Gears of the American Engineering Standards Committee. He said that a meeting of the Sectional Committee was held October 27 last and that consideration was given to the present S. A. E. standard for starting motor pinions which reads as follows: "Flywheel starting motors shall be equipped with an 8-10 pitch, 11 tooth, 20 deg. pressure angle pinion. The clearance on the pitch line between the pinion and the flywheel shall be from 0.015 to 0.025 in." It is suggested by the Sectional Committee that "clearance on pitch line" be made backlash. It was further agreed to define backlash as follows: "Backlash is the play between the teeth of a pair of gears mounted at the specified center distance, the increased width of space to be obtained by an addition of not more than 0.025 in. in the thickness of the cutter, so that the bottom diameter will not be so small as to weaken the pinion." The secretary was instructed to write to the S. A. E. for approval of this suggested modification. The Sectional Committee in going over the A. G. M. A. standards and proposed standards made a number of other suggestions. For instance, in connection with the A. G. M. A. composition gear standard, which mentions by name several materials now used for non-metallic gears, it was suggested to delete these names, as trade names are not to be used in American standards.

Various changes were also suggested in the A. G. M. A. recommended practice for gear inspection, which has been published in a previous issue of AUTOMOTIVE INDUSTRIES. These changes are as follows:

### Gear Inspection Changes

"Keyways.—Keyways, single and multiple, for straight and tapered holes, should be inspected for width by using 'go and no go' flat limit gages, gaging the width only. For alignment a plug gage with a key or keys will be used, with the diameter of the plug and width of key enough smaller than the low limits to meet the requirements of the work in hand. The key should be long enough to reach the entire length of the keyway; the height of the keyway equal to the customer's low limit. If the maximum depth is important, a similar gage should be used as a 'no-go,' having a height equal to the maximum shown in the customer's drawing. Keyways for Woodruff keys should be inspected by using a hardened gage similar in shape to the key, slightly thinner than standard, and sliding a key-seated ring gage over the key when in place in the keyway. Two keys may be put in the ring gage to agree with the depth limits on the customer's drawing. For width of keyway in the shaft, use a 'go and no-go' flat limit gage, both ends of which should agree with customer's limits.

"Shafts.—Splined shafts should be checked for width

of spline, roots and outside diameters, using 'go and no-go' snap gages made to the dimensions given on the customer's drawing or a micrometer used. For accuracy of spacing use a ring gage having one portion ground to the minimum limit of the large diameter, bottom to bottom of keyways, in the mating part, and at one end a slotted portion with a diameter of hole equal to the minimum diameter of the bore of the mating part and made with slots of width equal to the maximum limit of the spline of the shaft.

"Shifter Grooves.—Shifter grooves should be inspected for diameter at the bottom of the groove by using a 'go and no-go' snap gage slightly thinner than the width of groove and made to dimensions of customer's drawings or a micrometer used. If a fillet is called for around the edge, round the snap gage enough to clear. For width of groove use a 'go and no-go' flat limit gage made to limits upon customer's drawings.

"Small Size Spur, Helical and Internal Gears.—Smaller size spur, helical and internal gears should be checked for pitch diameter, eccentricity and irregular teeth by inspecting on a hand stand, the essentials of which should be rigidity of construction, one rigid and one freely sliding head, so arranged that the movement of the sliding head will actuate a dial indicator. Hardened master gears of proven accuracy should be used. The studs on which the work and master are mounted should be at right angles with the surface on which the sliding head moves and parallel with each other within 0.002 in. in 12 in. The diameter of the work stud should equal the diameter of the 'go' gage, and the stud in the master gear should be about 0.00025 in. less than the hole."

This recommendation also included the definition of backlash which has already been given. The above recommendations of the Sectional Committee were adopted by the A. G. M. A.

At a further meeting of the Sectional Committee, held on January 19 last, a research committee on gears was appointed, consisting of Wilfred Lewis, Earle Buckingham, A. M. Greene, Jr., R. E. Flanders and Charles E. Logue. At this meeting it was voted that the S. A. E. starting motor pinion standard with the proposed changes be submitted to the sponsor bodies as a proposed tentative American standard, provided the proposed changes met with the approval of the S. A. E.

Mr. Waterman also made a brief report for the General Standardization Committee of the A. G. M. A. He said that practically all of the work of this committee had been carried on jointly with the Sectional Committee.

### Bevel Gear Committee Report

Several subcommittees of the Standards Committee also reported during this session. The most important of these reports from the automotive standpoint was that by F. E. McMullen, chairman of the Bevel and Spiral Bevel Gear Committee, which follows:

Backlash.—The amount of backlash varies with the pitch of the gears and the committee suggests the following amounts for bevel gears:

D. P.	Backlash*	D. P.	Backlash*
12	.003"-.005"	4	.008"-.012"
10	.003"-.005"	3	.010"-.014"
8	.005"-.008"	2	.015"-.020"
6	.006"-.009"	1½	.021"-.027"
5	.007"-.010"	1	.031"-.040"

\*Backlash specified above is to be measured when the pitch lines of the gears are together. Runout of the pitch line will affect the backlash, which should be measured at the tightest point. In the case of gears to be hardened the backlash measurements should be made before hardening.



For bevel gears above 2 D. P. the backlash can be obtained from the following rule:

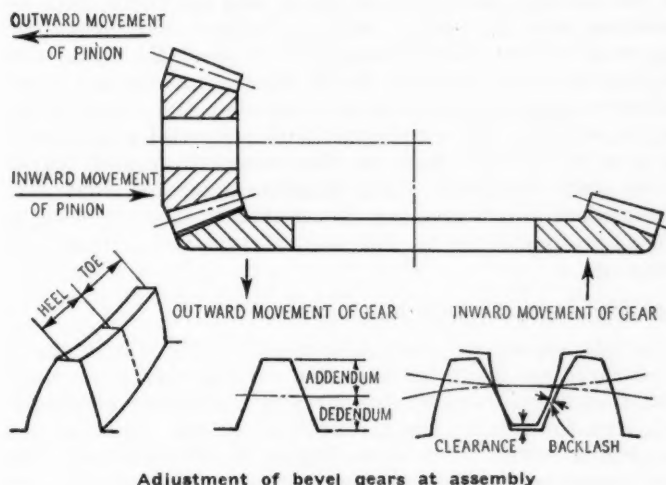
$$\text{Backlash} = 0.01 \text{ in.} \times \text{circ. pitch}$$

$$\text{or } \frac{0.0314}{\text{D. P.}}$$

### Adjustment of Gears at Assembly

The proper adjustment of bevel gears at assembly is a vital factor in obtaining quiet and durable gears.

There are two distinct considerations in obtaining the proper tooth contact; one is the bearing along the tooth, lengthwise bearing, the other the bearing up and down the tooth or profile bearing, and it is essential that the two be considered separately to obtain the proper results in combination.



In the above illustration are given graphic definitions of the terms used in describing the proper procedure to mount a spiral bevel gear. Gears are cut with a predetermined amount of backlash to suit the pitch and operating conditions, and this backlash should not be altered by any great amount to obtain the proper tooth contact, as the necessity of such a step indicates a fault either in the cutting or in the alignment of the supporting bearings. The usual amount of backlash is from 0.004 in. on 8 pitch gears to 0.012 in. on 3 pitch.

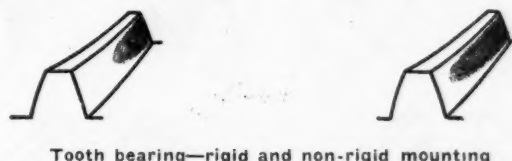
Gears, when mounted in a rigid testing machine, should show a bearing toward the small end of the tooth, and the amount the bearing favors the small end is determined experimentally by the stiffness of the mounting the gears are to be finally assembled in. Any spring in the mounting of the gears under load will cause the bearing to move toward the large end, and in no case should the bearing be heaviest at the large end of the tooth under the operating load. Any extra load, such as induced by suddenly applying the full load, will cause the bearing to become concentrated on the top corner of the large end of the tooth and breakage will ensue. In the figures below are shown typical tooth bearings obtained in a testing machine and when mounted in an automobile axle, also the effect of spring in the mounting on the apexes of the gear and pinion. It will be observed that the apexes do not coincide when the gear mounting has sprung under the working load. Therefore, when cutting the gears, it is necessary to make provision for this lift or spring.

Bevel gears are commonly cut to run flush at the large end of the teeth, and as a first step they should be so assembled in the mounting for an initial trial. Powdered red lead and any light machine oil should be

mixed and spread over the working surfaces of the teeth with a brush to show clearly the tooth contact that is obtained.

There is no difference in the method of adjusting spiral or straight bevels, and while the following statements are particularly applicable for spiral bevels, they are also true for straight bevels.

After mounting the gears flush with the proper amount of backlash, they should be operated under load in each

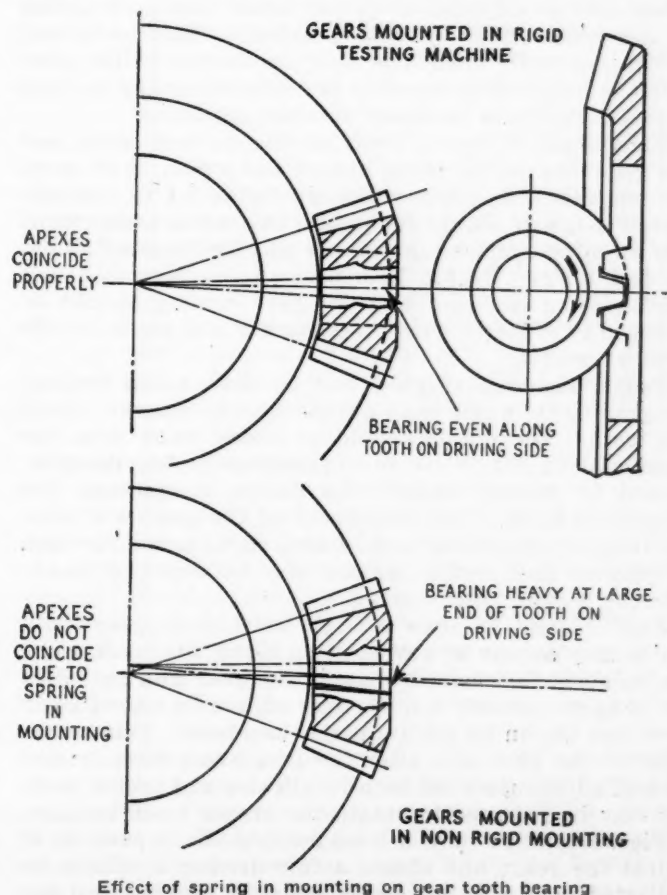


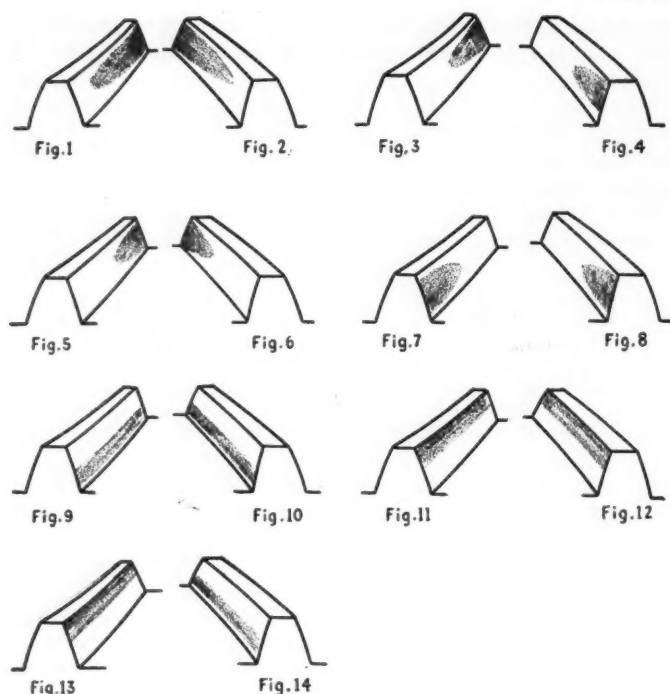
direction for a minute. In the case of the automobile rear axle driving gears the rear axle should first be raised to have the wheels clear the floor, then start the motor and drive the wheels in both directions with the brakes applied to obtain the necessary load.

All figures show the bearing on the gear tooth. With a right-hand spiral bevel gear (mating with a left-hand spiral pinion) mounted in an automobile, the driving side is on the convex side of the tooth and the concave side of the tooth is used when in reverse.

The tooth bearing, both lengthwise and profile, should appear as shown in Figs. 1 and 2 (see next page), but a condition of tooth contact may be obtained as indicated in Figs. 3 to 14. The lengthwise bearing adjustments will first be considered.

**Lengthwise Bearing Adjustments.**—Figs. 3 and 4 show what is called a cross bearing and is caused by either a misalignment of the mounting or an error in the cutting. The mounting should be tested and if found faulty, should be corrected. If the drive side has a toe





Examples of bearing on gear tooth

bearing and the reverse a heel bearing, the gears are serviceable provided the bearing is about  $\frac{5}{8}$  of the tooth length, but if the heel bearing occurs on the drive side, it should not be used and the cutting conditions should be altered if the mounting is found correct.

Figs. 5 and 6 show a toe bearing on each side of the tooth, and the gear must be moved away from the pinion to increase the lengthwise bearing, which on ratios 1-1 to approximately 4-1 will change the profile bearing to some extent and an adjustment of the pinion may be required as described under "Profile Bearing." This movement of the gear will introduce more backlash and the gear cutting should be changed to properly locate the bearing if this increase in backlash becomes excessive.

Figs. 7 and 8 show a heel bearing on both sides and the gear must be adjusted toward the pinion to increase the lengthwise bearing, which on ratios 1-1 to approximately 4-1, will change the profile bearing to some extent and an adjustment of the pinion may be required as described under "Profile Bearing." This movement will decrease the backlash and the gear cutting should be changed to properly locate the bearing if there is insufficient clearance.

**Profile Bearing.**—Figs. 9 and 10 show a low bearing on gear tooth which may appear at any position along the tooth. The pinion should be moved away from the gear, and on ratios 1-1 to approximately 4-1, the gear should be moved towards the pinion to maintain the proper backlash. This movement of the gear will alter the lengthwise bearing and several adjustments for both lengthwise and profile bearing may be required to obtain the proper tooth bearing.

Figs. 11 and 12 show a high bearing on gear tooth which may appear at any position along the tooth. The pinion should be moved towards the gear and on ratios 1-1 to approximately 4-1, the gear should be moved away from the pinion to maintain the backlash. This movement of the gear will alter the lengthwise bearing and several adjustments for both lengthwise and profile bearing may be required to obtain the proper tooth bearing.

Figs. 13 and 14 show a lame bearing. It is possible to adjust the gears and obtain a fair driving condition as indicated in Fig. 1, but a poor coast or reverse, and the

only method of completely eliminating the trouble is to properly cut the gears.

It must be borne in mind that the adjustments cited should be moderate and if great amounts of adjustments are needed, the mounting and gear cutting must be carefully checked, and the necessary steps taken to correct the trouble in the manufacture of the gears or mounting.

After a brief discussion the recommendation with respect to backlash was adopted as a standard for future design and the recommendation respecting mounting of bevel and spiral bevel gears as recommended practice.

On Friday morning a number of committee reports were received and the rest of the day was given over to a visit to Niagara Falls. A certain amount of discussion followed the report of the Committee on Uniform Cost Accounting made by J. H. Dunn. Mr. Dunn pointed out that his committee had made a report at every meeting in the last four and one-half years and yet there were 44 members who had never indicated either disapproval or approval of the recommendations made. He made the suggestion that possibly there should be district committee workers on the subject, or that the Association might consider the employment of a special accountant to give his entire time to the Association and travel from plant to plant. Mr. Hamlin suggested that Mr. Dunn meet the Executive Committee to discuss with it measures calculated to increase interest in uniform cost keeping.

#### Gear Strength Testing Machine

In his report on composition gears, Mr. Christensen elaborated on what he had said on the day preceding, viz., that some work was under way toward developing a machine for testing the strength of gears. In this connection a letter from Prof. Henry A. Wolsdorf, of the University of Cincinnati, was put into the records. At the present time a machine is being designed at that institution for determining the pitch line load required to break off gear teeth. When the design is completed and has been approved by several competent engineers it will be built, provided funds are available for the purpose. Tests will then be made on this machine to establish the relation between this load and the pitch, pressure angle, velocity at pitch line, length of arc of action, width of face, characteristics of material and nature of load (constant or sudden impact). Many gears will have to be broken before all these relations are accurately established. Seven years ago Wilfred Lewis built a gear testing machine for the University of Illinois, but this machine has never been used, being faulty because of excessive friction, lack of flexibility and speed. It is therefore desirable to design another machine to overcome these objections. The objects are entirely educational and results would be published for the benefit of all interested in gear problems.

#### All Officers Re-elected

As members of the Executive Committee J. B. Foote, Foote Bros. Gear & Machine Co., Chicago, and E. J. Frost, Frost Gear & Forge Co., Jackson, Mich., were re-elected for three years, and C. F. Goedke, William Ganschow Co., Chicago, and W. H. Phillips, R. D. Nuttall Co., Pittsburgh, were elected members for three years. They, in turn, in an organization meeting, returned as officers: President, F. W. Sinram, Van Dorn & Dutton Co., Cleveland, Ohio; First Vice-President, R. P. Johnson, Warner Gear Co., Muncie, Ind.; Second Vice-President, B. F. Waterman, Brown & Sharpe Mfg. Co., Providence; treasurer, F. D. Hamlin, Earle Gear & Machine Co., Philadelphia. Mr. Hamlin was elected secretary a year ago for a term of two years.



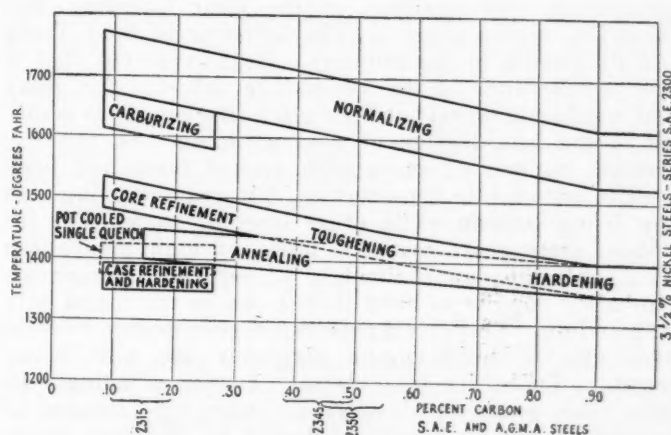
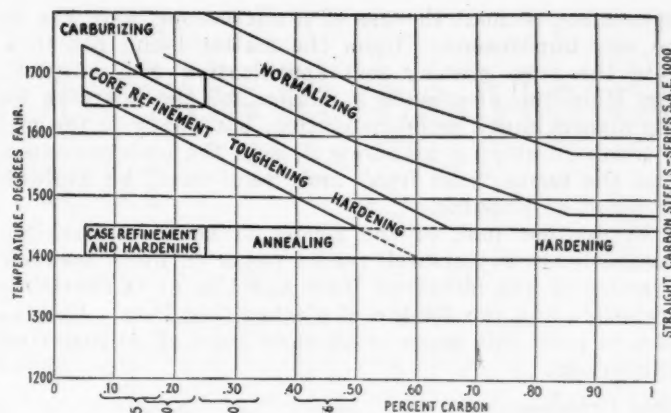
At the dinner Friday evening John C. Bradley, of Pratt & Letchworth Co., Buffalo, asserted that excessive taxation was throttling business, but he emphasized that, notwithstanding unfavorable legislation, "we are well on the road to recovery." "Of course," he said, "those accustomed to wartime prosperity may not be satisfied with the volume of business in the immediate future, but compared to a pre-war average, it is more than satisfactory. Sane prosperity is ahead as contrasted with wartime excesses."

At the Saturday morning session several more reports by standardization subcommittees were presented. Lars Nilson, reporting for the Keyway Committee, said that he had only a progress report to make. A great many tables of key and keyway sizes had been published and while most of them agreed pretty closely in regard to width of key, they were not in very close agreement with respect to depth of keyway. At present, sentiment seemed to favor the use of square keys for shafts up to 3 in. diameter and of flat keys for larger shafts. The A. G. M. A. was one of the sponsor bodies, together with the A. S. M. E. and it was necessary to bring about agreement between the committees of these two bodies. The A. S. M. E. had recommended a double standard, covering both square and flat keys for all sizes of shafts. The A. G. M. A. Committee was of the opinion that there should be only one standard key for any given size of shaft and recommended square keys for shafts up to  $3\frac{1}{4}$  in. diameter and flat keys for larger shafts. The committee in a table it had worked up also gave sizes of flat keys for shafts up to  $3\frac{1}{4}$  in. diameter and for square keys for larger shafts, but wanted to designate these keys as a second choice and not as the standard. In the case of the flat keys, the depth of the key was taken as equal to the nearest  $\frac{1}{16}$  in. size to two-thirds of the width of the key. Tolerances for keys and keyways were also given in the table and these agreed with the tolerances adopted by the British Engineering Standards Committee and the proposed A. S. M. E. standard. The only difference between the A. G. M. A. committee recommendation and the A. S. M. A. proposed standard was that the latter called all of the sizes of keys listed, standard keys, whereas the A. G. M. A. proposal was to call square keys for up to  $3\frac{1}{4}$ -in. shafts and flat keys for shafts above that size, standard, and the rest of the keys listed, second choice. Upon discussion it was decided to have the report multigraphed and distributed to the members for their comment.

In the absence of Chairman C. R. Weiss, the report of the Sprocket Committee was made by S. O. White. Mr. White said that it had been found necessary to make a slight revision in the form of the standard sprocket tooth adopted at a previous meeting. It was necessary, however, to co-operate with the corresponding committees of the S. A. E. and the A. S. M. E. and the committee expected to have something definite to report at the meeting next fall.

C. B. Hamilton, Jr., reported for the Metallurgical Committee. In connection with this report a couple of charts giving the heat treatment temperature ranges for different steels, based upon the carbon contents of the steels, were presented. Mr. Hamilton said that charts for all of the A. G. M. A. steels based on the S. A. E. recommendations recently published were being prepared.

The Metallurgical Committee made the suggestion that the term "cast steel" be dropped in connection with gear steels, owing to the fact that it is much used for designating certain kinds of tool steel, and that the term "steel casting" be used instead. It was also suggested that the term "cast iron" be dropped and the more spe-



Heat treatment temperature ranges for different steels

cific terms "gray iron" and "white iron" be used instead. It was further suggested that the term "semi-steel" be abandoned and that the material referred to be described as gray iron with a certain amount of scrap steel. In the discussion it was asserted that the use of the term "cast iron," which was so firmly established in the industry, could not be readily discontinued. On the other hand, there has been a great deal of objection to the use of the term "semi-steel" which has always been regarded as a misnomer. Both the S. A. E. and the A. S. M. E. were opposed to the term. There are now no established specifications for this material, but the S. A. E. is planning to draw up such specifications. Mr. Frost said that his firm commonly used such expressions as 40 per cent semi-steel, which meant gray iron with 40 per cent of scrap steel added, but he admitted that it was poor terminology as a material could not be both "40 per cent" and "semi."

The report also included a test for steel castings. It was proposed to grind and etch a section of the casting and then examine it with respect to grain structure and the requirement was to be made that the coarse structure characteristic of unrefined cast steel must be completely absent. In this connection some discussion arose on the point as to just how this test was to be carried out. Some members feared that if the gear makers were to be too strict with the steel foundries it would result in an increase in price. On the other hand, the opinion prevailed that, inasmuch as gear makers were held responsible for the material in their gears by their customers, they, in turn, must hold the suppliers of this material responsible. One member mentioned that the Bethlehem Steel Co. had arranged to test every ingot in substantially the same way as suggested by the Metallurgical Committee. The test could be made by very simple

apparatus, without the use of a microscope, and was in no way burdensome. Upon the matter being put to a vote the steel casting test specification was adopted. Mr. Hamilton also made a motion for the adoption of the nomenclature recommendation, but owing to the opposition developing withdrew it, with the understanding that the terms "cast iron" and "semi-steel" be avoided as much as possible.

As another part of the report of the Metallurgical Committee S. P. Rockwell read a paper on Recommended Practice in the Selection, Test and Use of Carburizing Materials and the Design of Carburizing Pots. We expect to print this paper in an early issue of AUTOMOTIVE INDUSTRIES.

### Gear Grinding

At the closing session on Saturday afternoon R. S. Drummond, vice-president of the Gear Grinding Machine Co., read a paper on The Grinding of Gear Teeth and Its Future in the Industry. He pointed out that it was the demands of the automobile industry for gears that would run quietly at high pitch line velocities which led to the introduction of gear grinding. So far, the greatest number of gears with ground teeth had been used in automobile construction, but gear grinding was now being introduced in other lines of work. For instance, some gears are now made of high manganese steel containing approximately 13 per cent manganese. This alloy steel is so hard that it can be machined only by grinding. The driving gears of gear-driven locomotives and of multi-engine airplanes are also being ground. There are two classes of gear grinding. In some cases gears which originally were not intended to be ground, are so greatly distorted by the heat treatment that they are very noisy and may then be salvaged by grinding their teeth faces.

The second class of gear grinding is the finish-grinding of gear teeth which have been rough cut and have had sufficient stock left for grinding. This constitutes the largest volume of gear tooth grinding to-day. The gear grinding process was originally introduced about 12 years ago, but up to a year ago its chief use was for salvaging gears that had been ruined by distortion in heat treatment.

The question was asked whether the grinding entirely took the place of finish-cutting, to which the answer was in the affirmative. One of the members mentioning that he had a couple of the Gear Grinding Machine Company's machines, another member asked whether he might infer from this statement that the machines could now be bought. Mr. Drummond replied that he was not prepared to announce a definite policy on this point, but that they had, in the past, placed a small number on machines where they thought they could expect skilled and conscientious operation.

A. C. Bryan, chairman of the Transmission Committee, which was constituted at the Rochester meeting last fall, had only a progress report to make, but promised that there would be something definite at the next meeting.

### Differential Gear Standards

S. O. White, chairman of the Differential Committee, which was also constituted at Rochester, said that his committee had started by working out a standard nomenclature for differential gears. They took as a basis the S. A. E. nomenclature, but made several recommendations differing therefrom. One of the new terms recommended is that of "complete differential," which covers the differential gear proper together with the rig gear and driving pinion. This part of the report was ac-

cepted as a progress report. Mr. White said that the committee was almost ready to circularize the Association with respect to two complete designs of differential gear. These are both of the four-pinion type and contain gears of the 20 to 11 and 18 to 10 sizes, both of 5-7 pitch. These are the two sizes in most common use on passenger and light commercial cars, respectively. The committee, therefore, plans to develop design of differential gears that are completely standardized, thus carrying standardization a little further than it has ever been carried before in automotive work. Later they expect to work out designs for other sizes as well.

H. J. Eberhardt made a report for the Tooth Form Committee. Special attention was given by this committee to the problem of standardizing the stub tooth and a questionnaire was sent to all members for the purpose of getting their views on the subject. The members were asked to consider a stub tooth having an addendum of 0.8/D.P., a dedendum of 1/D.P., a working depth of 1.6/D.P. and a pressure angle of 20 deg., which in these respects coincides with the A. G. M. A. standard herringbone gear tooth section in the plane of rotation. Of 13 replies received 8 favored the proposal and 5 opposed it. The reason the committee took up the stub tooth first was that they were asked by the Netherlands Committee on Tooth Form Standardization to take up this work. The Netherlands committee, in making this proposal, aptly remarked that the cost of making new cutters and of carrying two or even three sets of different cutters during the period of change-over loomed very large. The report was accepted.

### Standard System of Bevel Gearing

The last item on the program was a paper on the Gleason Works system of bevel gears by F. E. McMullen and T. M. Durkan. The Gleason Works showed to the A. G. M. A. at its meeting in Rochester last fall a new system of gears which they had worked out and which they intended to offer to the A. G. M. A. as a standardized system of bevel gearing. The system then presented was worked out with a view to securing maximum rolling and minimum sliding action. It was found, however, after a number of samples had been made and tested out in practice, that they were rather more noisy than gears made to the old designs. The system was, therefore, discarded and a new system designed chiefly with a view to silent operation, and it was this system which was explained at the Buffalo meeting.

Mr. Durkan, who read the paper, pointed out that the bevel gear systems now in use were based entirely upon spur gear practice. In the design of a spur gear system, the great object in view was interchangeability of gears of all sizes from 12 teeth pinions to a rack, and in order to attain this object sacrifices in respect to other desirable qualities were made. Now, in bevel gears there is no interchangeability, as for a right angled drive a bevel pinion will mesh properly only with a gear specially designed for it, and the sacrifices made in order to insure interchangeability in the spur gear system, therefore, bring no corresponding advantage here. One of the requirements of interchangeability is a constant pressure angle for all sizes of gears. This, therefore, has been abandoned in the new system of bevel gearing, and three different angles are used, of  $14\frac{1}{2}$ ,  $17\frac{1}{2}$  and 20 deg. Mr. Durkan explained the complete system, using a number of diagrams illustrating it. We expect to reprint his paper in an early issue of AUTOMOTIVE INDUSTRIES. It is planned to get this system ready for presentation as a proposed A. G. M. A. standard for the next meeting.



# Some Recent Developments in the Motor Bus Field

The new twenty-passenger G. M. C. bus and a new model twenty-three-passenger Duplex bus are described and the chassis compared with the truck chassis of which they are modifications. Particulars regarding a Canadian double-deck body and some bus materials and parts also given.

**A** NEW twenty-passenger bus has recently been brought out by the General Motors Truck Co. The bus is mounted on a chassis which has been especially adapted to this type of body, and it is carried on 36 x 6-in. cord tires all around. In designing the chassis, by combining a long wheelbase with long, flexible semi-elliptic springs, easy-riding qualities have been secured. The body overhangs the frame but slightly, and this, it is claimed, eliminates much of the side sway and whipping which have been common with buses with a wheelbase which is considerably shorter than it should be for a long body. The frame on the new chassis overhangs the rear axle by only a few inches.

The powerplant is the same as that used in the G.M.C. two-ton truck. The engine is governed to permit maximum speeds of 30 m.p.h. In test, the bus, fully loaded, was driven at 25 m.p.h. up a 4 per cent grade on high gear. The G.M.C. 4 x 5½-in. engine, which has been described in these pages, incorporates features such as removable cylinder sleeve, removable valve lifter assemblies, pressure lubrication, hot-spot vaporization, etc.

Aside from the engine, the chassis is comparable in most respects to that used in the G.M.C. one-ton truck known as model K-16, but has a much longer wheelbase, 178 in. as compared to 132. This necessitates deeper side members in the frame, these being ¼ x 5⅞ as compared to 5/32 x 4½. The front springs are 4 in. longer and are made of alloy instead of carbon steel. The use of 36 x 6-in. instead of 34 x 5-in. tires, together with the deeper frame and the different spring characteristics makes the top of the frame about 4 in. higher above the ground than that on the one-ton truck. Other differences include the use of a larger gasoline tank, larger radiator, a center bearing on the longer propeller shaft, a large steering wheel and certain additional equipment such as a vacuum tank, speedometer and Klaxon horn.

Interchangeable brake rods are employed to make it possible to use both the internal and external sets of brakes for foot operation. The bus is provided with radius rods which take the drive and hold the axle in a fixed position so that braking conditions are the same, regardless of the load in the bus. The bus chassis will be sold alone in cases where special body equipment is demanded.

The bus body is furnished with two seating arrangements, one adapted particularly to interurban bus operation and the other designed for city passenger work. The body is built of oak reinforced with metal and is

finished outside in smooth-panelled surfaces. The bus has been built with a width of 47 inches and the seating arrangement has been made to correspond with this width without sacrifice to comfort or balance. The interior of the bus is finished in panelled oak, with rattan seats. The equipment includes non-rattling adjustable windows, complete buzzer signal system, front entrance door controlled from the driver's seat, rear emergency door, rear vision mirror, dome lights and an advertising card rack. The fuel tank is located outside and is filled from outside without inconvenience or fire risk.

## The Duplex 23 Passenger Bus

Another model of bus has recently been announced by the Duplex Truck Co., which has furnished, among other installations, a large fleet of buses for use in Washington. The chassis used is identical in most respects with that used in the 2½-ton Duplex truck, but it has a slightly shorter wheelbase (160 in.) made necessary by the use of a different axle. The frame length is the same as that on the truck but because of the more uniform loading, a 5-in. instead of a 6-in. frame is employed, ¼-in. stock being used in both cases. The truck is equipped with a No. 4 Vulcan rear axle, 40 x 8-in. tires in rear, and 36 x 6-in. pneumatic front. The bus chassis is equipped with a model W-103 worm drive, Sheldon rear axle, the rear tires being 38 x 7-in. and the front 36 x 5-in. pneumatics.

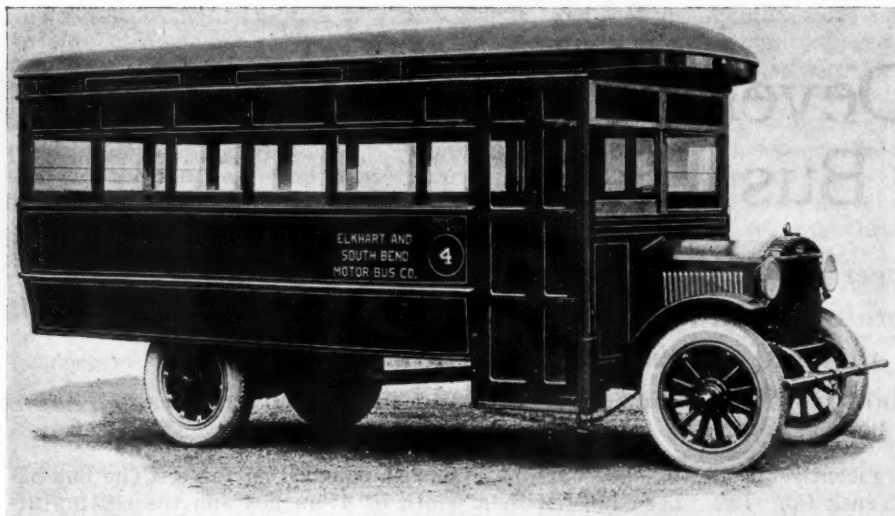
A Hinkley 4 x 5¼-in. four-cylinder engine is used in both chassis, the governor being omitted in the case of the bus engine.

The gear ratio on the bus is 6½ to 1; on the truck it is optional. The gage of the rear wheels in the case of the bus chassis is 62 in., or 2 in. greater than in the truck.

Other specifications of the bus chassis are as follows:



G. M. C. twenty-passenger bus



New twenty-three passenger Duplex bus

Wheels, artillery type; brakes, both internal expanding on 18-in. rear wheel drum; two-unit starting and lighting system and battery ignition; fuel tank of 25-gal. capacity, feed by vacuum tank; multiple dry disk clutch; four-speed gearset; worm and nut steering gear. The equipment includes: Motometer, speedometer, electric horn, Alemite lubrication, front bumper, Gabriel snubbers front and rear, and power tire pump.

The body is of hardwood, with steel reinforcements. Side panels are of steel and the roof of agasote and aluminum covered with oiled duck and painted white on the under side. The seating capacity is for 23 passengers. The operator's seat is in a vestibule separated from the passenger compartment by glassed-in partitions. The folding front door is 25 in. wide and a rear emergency exit door is provided. Headroom is 6 ft. 4 in.

Standard body equipment includes: advertising racks, ventilators, exhaust heaters, lights in domes, fare register, fare box and mechanical door opener.

#### Double-Deck Bus in Canada

A double-deck bus has recently been constructed in Canada for the Toronto Transportation Commission. The chassis was constructed by the Eastern Canada Motor Truck Co. and is assembled from the following units: Buda four-cylinder engine, Clark internal gear axle, 36 x 10-in. Morand demountable cushion rear wheels and special nickel steel frame, designed to give as low steps as possible. The wheelbase is given as 186½ in. and the track, center to center of rear wheels, as 74½ in.

The body is manufactured by the Ottawa Car Mfg. Co., Ltd., who furnish the following particulars:

This bus is similar to those adopted in Toronto, New York City and Detroit. The main idea in design was to adopt a low-hung chassis which has been specially built, giving only two steps into the body of the bus. Heights being, rear 17 in. from ground to platform, 11 in. from platform to body, front steps 13 in. from ground to first step, and 13 in. from step to body floor. There is a winding stairway leading to an upper deck, capable of seating 30 passengers. The height from the ground to the upper deck side rail, which is the highest point of the bus, is 10 ft. 9 in.

All seats in upper deck are of wood slat design, as they are exposed to the weather. Wood slats are also installed over the canvas on the roof.

The interior rattan upholstered seats are capable of seating 21, seven cross seats, one single cross seat at the front and two longitudinal seats at rear. Cushions and

backs are fitted with the Ottawa Car Mfg. Co.'s toggle spring.

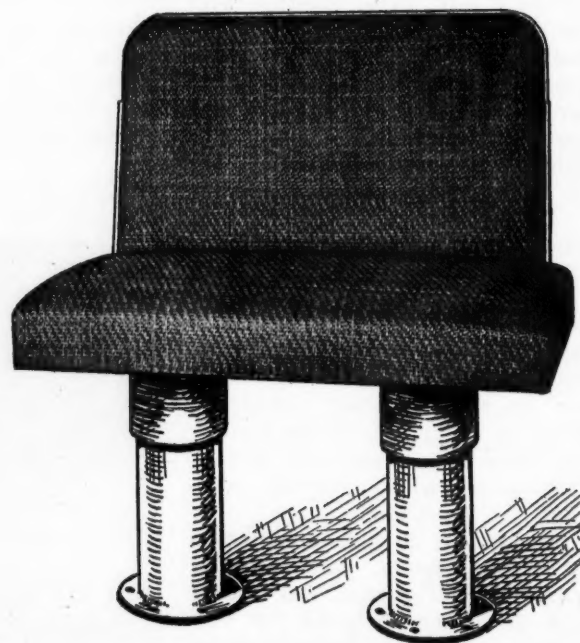
The interior agasote ceiling is painted ivory, agasote waist panels painted green, woodwork mahogany stain.

Seven flush dome lights are installed in the ceiling, some of four and some of nine candlepower. Wood slats are installed on the floors and push bells are provided on each side post on the lower deck and side rail on upper deck. Communication between conductor and motorman is by a hand bell and vice versa by electric bell.

Drivers' quarters are comfortably fitted with pantasote trimming, cushion spring upholstered and stuffed back, giving ample room for operating steering apparatus and levers.

This bus, the first of its kind built in Canada, is convertible for one-man operation if required. It has a front

entrance door which can be operated by the driver from his seated position by a simple arrangement of levers. All working parts of door are mounted on ball bearings making it easy to operate. A small door is installed to the left of the driver for his convenience and double automatic sash on the left hand which can be opened in warm weather. The sash in front of the driver has no top rail to obstruct his vision, when it is in a lowered position. This sash can be lowered 12 in. by automatic locks. All side sashes drop into pockets, making a comparatively open bus for summer service. Trap doors are installed to facilitate access to gearset. Four ventilators, two on each side, are installed on the upper sash for winter use. Curtains are of double-face Fabrikoid installed on all-metal rollers and have pinch handle fixtures. A conductor's seat, which is adjustable to height and swings under the stairs when not required, is installed on the rear platform. Two signs indicating route and destination are installed in front over windshield, also two in the two upper rear sash on the door side. Perfection heaters are provided under four cross seats regulated from valve installed at the driver's bulkhead. Length of rear platform is 3 ft. 5 in., height lower deck floor to ceiling, 5 ft. 10 in., width at belt rail outside, 7 ft. 4¾



Parker pneumatic bus seat



in., and length of body is 17 ft. 8 in.

### Bus Roof and Panel Material

Haskelite, a waterproof plywood, which is molded to form and shipped ready to fasten to top bows is being marketed by the Haskelite Mfg. Corp. This material, which, as we understand it, requires no exterior covering other than paint or varnish, possesses considerable strength, yet its weight, given as 0.89 lb. per sq. ft., is said to be less than that of a slat roof combined with a head lining. Both interior and exterior surfaces are smooth. The interior, being enameled, is easily cleaned by washing. Due to its arched shape and light weight, it is said to withstand vibration better than some other types of roof and to reduce the tendency to swaying by lowering the center of gravity. The roof panels are three-ply and measure 5/16 in. in thickness. Several sizes ranging from 48 by 90 in. to 60 by 144 in. are carried in stock.

The same concern also furnishes "plymetl" for making bus body side panels, which is haskelite faced with thin sheet steel cemented to one or both sides. This material can be readily bent into curved panels and is said to weigh from 25 to 45 per cent less than sheet steel body panels of 20 and 18 gage. In addition, it is said to eliminate metallic drumming, give insulation against cold, increase seating space and decrease cost by eliminating the need for side lining, avoid wavy surface and consequent highlights which sometimes occur with all-metal panels and afford excellent surfaces for finishing and glueing. The panels are 1/4-in. thick, rolled steel face, being sanded and galvanized. Stock sizes are 24, 30 and 36 in. wide and 96 in. long.

A new type of bus seat, the base of which has one or more pneumatic cylinders or dash pots, is being marketed by the Parker Pneumatic Bus Seat Co. The back and cushion are similar in appearance to those used in other bus seats, and are arranged to move together, but the base is formed by a pair of telescoping cylinders held apart by



British folding top bus. Top open and closed

a heavy helical spring which is compressed by the weight of the seat and its occupants. When the vehicle passes over rough roads the cylinders are given an up-and-down motion which is damped by the dashpot action of the air in the cylinder, the air being compressed and forced out of a small hole on the down stroke, with reverse action in returning to normal position. The device is in effect a shock absorber applied direct to the seat, and is said to greatly improve riding qualities.

### A Folding Roof Bus

A British manufacturer, Christopher Dodson, Ltd., has recently designed a folding top bus which is so constructed as to be readily transformed from an open to a closed type or vice versa. The main portion of the roof is designated to fold up so that it occupies only a narrow space along the center, while the side windows can be dropped out of sight. The fact that the roof occupies so little space when folded makes it excellent for sightseeing and for touring. Front and rear of the bus are not folding. They serve to protect occupants from undue wind and dust and also to simplify the construction.

## Why Lumber Is Steamed During Kiln Drying

**T**HERE seems to be a common impression that the purpose of steaming lumber is to "remove the sap." This is far from being the fact, for when lumber is steamed it takes on moisture, as a rule, instead of giving off anything.

The reason for steaming lumber during drying depends on when it is done, but nearly always the treatment is given for one of the following purposes: (1) To heat lumber through quickly at the start; (2) to relieve stresses which otherwise would produce checking, case-hardening and honeycombing; (3) to equalize the moisture content and condition the lumber ready for use at the end of the run; (4) to kill fungi and insects in the wood.

When lumber should be steamed, how long the treatment should last and what temperature should be maintained are points which have been determined at the Forest Products Laboratory by experiments on many species of wood. A thorough understanding of the steaming operation is essential, because the whole kiln charge can easily be ruined by too severe a treatment.

One of the chief needs of many commercial kilns is proper steaming facilities, without which a high degree of success in the artificial seasoning of wood is impossible.

**A** NEW type of steel which is highly susceptible to the acquisition and retention of magnetic properties, has been discovered, according to *Chemical and Metallurgical Engineering*, by a Japanese. It has the composition: Carbon, 0.4 to 0.8 per cent; cobalt, 30 to 40 per cent; chromium, 1.5 to 3 per cent; tungsten, 5 to 9 per cent. It is very brittle and very hard, and great care has to be exercised in its manufacture. Its coercive range is about three times that of the best tungsten steel; the area of the hysteresis curve is also three times as great; the permanent magnetism is relatively very high; lastly, shocks and prolonged heating have a negligible effect on the magnetization. In shock tests a slight diminution in permanent magnetism was observed—6 per cent after 850 impacts by dropping from a height of 1 meter on to a cement floor.

# Reconditioning Crankcase Lubricating Oil by a New Method

Fuel diluent and water automatically removed from crankcase lubricating oil by a simple refiner which also filters out sediment. Can be installed in any automotive vehicle and operates with splash or force feed systems.

**A** SYSTEM for automatically removing the fuel diluent and water admixture from crankcase lubricating oil and at the same time filtering out the sediment composed of carbon, sand and metal particles has been developed by a group of engineers and tried out with satisfactory results in the laboratory and also as supplied to truck and tractor engines. It is known as the Gross crankcase oil refiner and was described in a recent paper by William F. Parish read before the Midwest Section of the S. A. E., from which paper the following particulars are taken.

The new system of crankcase oil regeneration consists of four main units, (a) the heating element, (b) the filter, (c) the refiner proper and (d) the cooler. The system is light and simple and occupies about the same space as a vacuum fuel system. It does not interfere with present lubricating systems, functions equally well with splash and force feed systems and can be readily installed in most any type of passenger car, truck or tractor.

Fig. 1 gives a plan view of this system, showing the flow of the diluted oil from the crankcase to the heating element and on to the filter and refiner, whence the oil is discharged to the cooler and back to the crankcase. The force causing the circulation of oil through the system is obtained from the vacuum present in the intake manifold, which ranges from 2 to 25 in. of mercury, according to the type and condition of engine, revolutions per minute, manifold design and other conditions. A tube extends

from the top of the refiner to the intake manifold, through which the vacuum or suction is transferred to the system, and through which the vaporized diluent is drawn off and burnt in the cylinders.

The temperatures shown in the sketch are given as approximately 130 deg. Fahr. for the oil from the crankcase to the heater; 400 deg. Fahr. from the heater to the refiner and 350 deg. Fahr. in the refiner, which temperature, plus the vacuum and agitating effect, quickly removes the diluent. From the refiner at 250 deg. Fahr. the oil passes to the cooler, with a further falling in temperature in the cooler, until the oil will go to the crankcase at about 125 deg. Fahr. The diluent, in the form of a fog or gas, goes into the intake manifold at temperatures up to 200 deg. Fahr., according to the distance of the refiner from the intake manifold.

## Operation of the Heater

Heat is taken from the exhaust by any one of several efficient ways. There is sufficient heat in the exhaust under practically every condition of operation to allow of the removal of most of the diluent from the oil. The heater, while in operation, is either filled with oil to the exclusion of air, or is working with oil passing through the heater under the force of a vacuum.

In this way charring of the oil is prevented. The heaters are cylindrical shells slipped over the exhaust pipes, or coils of various designs, either machined or made from tubes or piping, inserted in the exhaust pipe or manifold. Heaters of several kinds have been cut open after thousands of miles of operation and have been found free from carbon deposit.

The refiner, which acts as a distillation flask in the removal of the fuel content from the lubricating oil, is integral with the filter and settling system. The oil comes from the heater to the first filter and settling chamber, where it passes through the screen or filter, from where the cleaned oil is drawn to the still proper and deflected by a baffle to a thin film of heated oil. The combination of the heat and the great reduction in boiling point produced by the vacuum, plus the agitation from the moving vehicle, causes a very rapid vaporization of the diluent. The diluent, in the form of a heated fog, then passes along the vacuum line into the intake manifold, and then to the cylinders, where it is consumed as fuel. The bottom of the still is arranged as a second settling chamber for the collection of such sludge and dirt as pass the first settling chamber and filter. Means are provided to clean out the accumulated dirt when necessary quickly and easily. The still contains the float mechanism that actuated the air and vacuum valves. This part of the system is similar to that employed for the vacuum fuel tanks, which is an item of value in considering service. There is the one feature of interest as influencing the wear of the only moving parts in the system. With the fuel vacuum-tanks the operating mechanism is mostly dry and occasionally covered with a

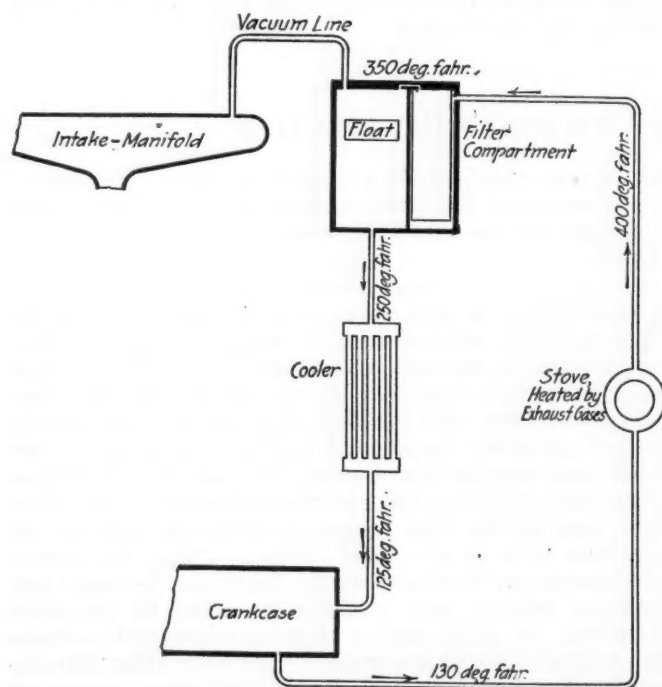


Fig. 1



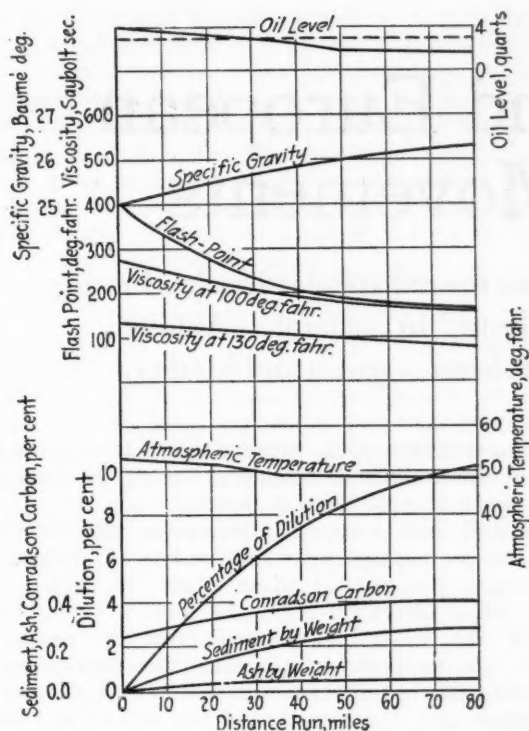


Fig. 2

sulphur powder from the gasoline fumes, while similar parts in this oil refining system are continually covered with oil. The perfectly lubricated parts should, therefore, outlast the engine to which the system is attached.

One of the most important elements in the system is the cooler. The cooler is placed where the air from the fan will dissipate the heat being thrown off from the oil. On engines where there is no fan for cooling, the cooler is placed near the flywheel.

Fig. 2, which shows the characteristics of many comparative tests, indicates the condition of the oil at various periods in the engine of a car operated in city traffic. The oil has become diluted to an extent of 10.2 per cent in 89 miles. The oil was drained and the engine filled with new oil of the same make and grade, some of the former 10.2 per cent diluted oil remaining in the engine and

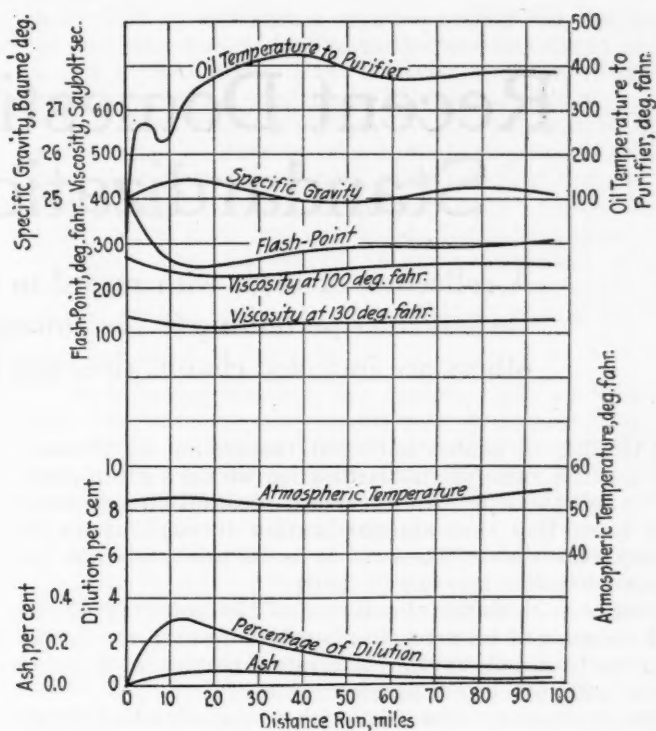


Fig. 3

diluting the new oil about 3 per cent as shown in Fig. 3. After 36 miles the dilution was 1.5 per cent and at 74 miles the dilution was under 1 per cent, where it remained. The viscosity of the oil at the end of the 98-mile run was within 5 sec. viscosity at 100 deg. Fahr., of the new oil. The viscosity remained the same in this engine during subsequent runs to a total of 2180 miles. Occasionally during these runs, which were in city traffic, 1 pint of raw gasoline would be put into the crankcase. This would be taken out of the oil inside of 30 miles. One pint of raw kerosene would be taken out of the oil in about 60 miles. The sludge removed from the bottom of the reclaimer tank generally contains a characteristic sediment of 75 per cent of oil, 12 per cent of carbon and 13 per cent of an ash composed of silica and metal. The ash and the carbon will vary with nature of roads and character of service.

## Properties of Steels at High Temperatures

IN Technologic Paper No. 205 of the Bureau of Standards the results are given of a number of determinations of tensile strength, proportional limit, elongation, reduction of area and strength at fracture throughout the range 20 to 500 deg. C. for four steels containing about 0.38 per cent carbon as follows: (a) Plain carbon steel; (b) 3½ per cent nickel steel; (c) 3 per cent nickel and 1 per cent chromium steel and (d) 1 per cent chromium, 0.2 per cent vanadium steel.

Brief reference is made to the types of fractures of steels tested at various temperatures, and particular attention is paid to comparison of the tensile properties of these alloys at 550 deg. C. Of the four steels tested in normalized condition, it appears that the two alloys containing chromium show greater resistance to weakening by increase in temperature to about 550 deg. C. than either the plain carbon or 3½ per cent nickel steels, and at this high temperature the chromium-vanadium steel is to be preferred from the standpoint of high tensile strength and limit of proportionality. The carbon and 3½ per cent nickel steels behaved alike with rise in

temperature above that of the room, and at about 550 deg. C. the addition of 3½ per cent nickel appears to have but little effect upon the strength of the carbon steel.

A summary is being prepared of the data obtained on the various carbon and alloy steels which have been tested in the metallurgical laboratories of the Bureau, including the effects of normalizing rolled-low carbon steel, the effects of 1¼ per cent of manganese, the presence of 5 per cent cobalt, the addition of 0.4 per cent of molybdenum to carbon chromium steel, and the effect of various heat treatments on their properties.

Progress has also been made in determining the effect of time-annealing at blue heat on the properties of cold-rolled boiler plate.

THERE are about 300 farm tractors in Roumania, according to a report received by the Department of Commerce from Bucharest. It is estimated that fully one-half of these are of a popular American make.

# Recent Domestic and European Standardization Movements

A collection of items with regard to movements toward standardization in various lines pertaining to the automotive industry in general. Among others are included chains, tires and rims, petroleum, varnish and lumber.

**T**HERE is almost universal recognition of the economic value of standardization within a given plant, and there is also a certain recognition but much less conviction that standardization throughout an industry increases efficiency. It is to this end that the standardization movement tends.

Progress in standardization and the securing of the full measure of economy in manufacture as a result will be greatly aided by the interested parties keeping in touch with the latest developments.

The following items deal with recent standardization movements in the United States and in Europe.

**S**PECIFICATIONS for the various refined petroleum products purchased by the Federal Government are given in Technical Paper 305, just issued by the United States Bureau of Mines. The specifications cover motor gasoline, aviation gasoline, naphtha, kerosene, signal oil, fuel oils, lubricants, etc. These specifications have been officially adopted by the Federal Specifications Board. They supersede the specifications published in Bulletins 1 to 5, inclusive, of the Committee on Standardization of Petroleum Specifications.

The Interdepartmental Petroleum Specifications Committee replaced the Interdepartmental Committee on Standardization of Petroleum Specifications, which had superseded the wartime Committee on Standardization of Petroleum Specifications. The work of the several committees has been continuous, and the present set of specifications is the result of several years' experience in preparing specifications and drawing up testing methods for petroleum products.

The present set of specifications was prepared by the Technical Committee on Standardization of Petroleum Specifications and adopted by the Interdepartmental Committee on Standardization of Petroleum Specifications, which were the immediate predecessors of the present committee.

The chairman of the Interdepartmental Petroleum Specifications Committee is N. A. C. Smith, of the Bureau of Mines. W. S. James, of the Bureau of Standards, is one of the other members.

Copies of Technical Paper 305 may be obtained by applying to the Bureau of Mines, Washington, D. C.

## Silent Chains

At a recent meeting of the Chain Division of the Society of Automotive Engineers Standard Committee, held jointly with the Committee on Steel Roller Chains of the American Society of Mechanical Engineers and the Committee on Sprockets of the American Gear Manufacturers Association, the subject of silent chain standardization was brought up, but it was the consensus of opinion that structural differences between makes prevent the

adoption of a standard at the present time. It was thought that normal silent chain development during the next few years will make standardization possible.

It was stated that to obtain interchangeability of silent chains it will be necessary to standardize the pitch, the included angle, the method of guiding, the width, the maximum radial clearance from the joint over the back of the link, the maximum distance from the center of articulation to the point of the link, the perpendicular distance from the bearing face of the link to the center of articulation and the location of the top of the teeth with regard to the chord connecting the centers of articulation. It was emphasized that the standardization of silent chains is further complicated owing to the actual differences in construction of the chains.

## British Tires and Rims

The British rubber tire manufacturers section of the Society of Motor Manufacturers and Traders for some time has been discussing standards for tires and rims and already has adopted certain standards. The subject is being steadily pursued and at a recent meeting, a letter was read from the Association of British Rubber Tire Manufacturers recommending that the British standard list should continue unaltered.

It was resolved to appoint a sub-committee to consider pneumatic tire and rim standards, and another sub-committee was appointed to consider solid rubber tire standards. Reference to the work of the Tire and Rim Association of America concerning standard rims resulted in the recommendation that the pneumatic tire sub-committee should endeavor to confer with rim and wheel manufacturers on the subject of standard rims.

## Varnish

The second edition of Circular 103 of the Bureau of Standards, distributed by the Superintendent of Documents, contains a specification for water-resisting spar varnish, and was prepared under the auspices of the Bureau of Standards by the U. S. Interdepartmental Committee on Paint Specification Standardization.

The revision is largely based on criticisms of the first edition made by certain varnish manufacturers' associations. The committee's draft was submitted to numerous representatives of the varnish industry, and careful consideration was given to their suggestions. The specification gives the general requirements and detailed methods of sampling and testing as well as the basis for purchase. The general requirements are that the varnish shall be suitable for use on inside and outside surfaces of vessels, buildings, etc., and must be resistant to air, light, and water.

Circular No. 117 of the Bureau of Standards consists of specifications for interior varnish. The specification states the general requirements and gives detailed methods



of sampling and testing as well as a basis for purchase. In the requirements it is stated that it shall be suitable for general interior use, including both rubbed and un-rubbed finish exclusive of floors; it must be capable of easy application of brush in the ordinary manner according to the rules of good standard products, must flow out to a good level, cut free from runs, sags, pits, or other defects, and dry with reasonable permanence to a hard semi-elastic glossy coating which can be rubbed in forty-eight hours or less.

According to Sir William Tritton, all British steam traction engines, portable engines, etc., are designed to drive at a belt speed of 2200 ft. p. min., and this is equally true of German, Austrian, American and Canadian engines. This standardization, it seems, was arrived at without any convention ever having been held for the purpose, and as a result of it any make of steam traction engine can be used to operate any make of threshing machine. In the British farm tractor trials held recently, the belt speeds, on the other hand, varied between 1830 and 3760 ft. p. min.

### Lumber

A movement is now on foot looking to the ultimate formulation of lumber standards, including terminology, sizes, grades and specifications. The movement is being fostered by the American Engineering Standards Committee, the National Lumber Manufacturers' Association and the Forest Products Laboratory, among other organizations. It is expected that a conference on this subject will shortly be called by the A. E. S. C., with whom those interested should communicate, at 29 West 39th Street, New York.

Prior to the war there existed an institution known as the International Association for the Testing of Materials, with headquarters in Vienna and branches in practically every industrial country. It had as its objects the development and unification of standard methods of testing; the examination of the technically important properties of materials of construction and other materials of practical value, and also the perfecting of apparatus for this purpose. From the parent body there had sprung the American Society for Testing Materials in this country, the Deutsche Verband für Materialprüfungen der Technik in Germany and the Italian Society for the Study of Building Materials in Italy. In England there existed a branch of the International Association, and a

movement to establish a national society for the testing of materials was on foot when the war intervened and put a stop to the efforts. Now, however, a new movement has been launched to organize a British association.

Following is a complete list of automobile standards issued to date by the British Engineering Standards Association: Spark plugs; screw threads, nut and bolt heads; tungsten filament lamps; pneumatic tire rims; wheel rims and tire bands for solid rubber tires; charging plug socket for electric vehicles; wrought steels; magnetos; body spaces and frame ends; ball journal bearings; rubber tires for British standard rims.

### Gage Steels

An informal meeting was recently held in New York for the purpose of considering improved specifications of composition and the heat treatment of gage steels. The meeting was arranged by the Ordnance Department of the United States Army and was well attended by steel makers, gage makers and gage users. A subcommittee was appointed to arrange and carry out a comprehensive program with a view to determining, first, the physical characteristics required of gage steel, and, second, the composition and heat treatment necessary to produce these characteristics. The active co-operation of Government research agencies, standardizing bodies, gage makers and users is contemplated by the committee in the program to be undertaken.

The specifications and tolerances for liquid measuring devices adopted by the preceding conference were reviewed by the Fourteenth Annual Conference of Weights and Measures held some time ago and several changes were made, the advisability of which was indicated by the experience gained during the preceding year. New tolerances were adopted, 2 cubic inches being allowed on deliveries of  $\frac{1}{2}$  gallon or less, 3 cubic inches on a single gallon, and 1 cubic inch per gallon additional in case of deliveries of more than this amount.

A recent meeting of the National Screw Thread Commission, held at the Bureau of Standards, was directed chiefly to a consideration of tap drill sizes and tolerances and dimensions and tolerances for nuts, bolt heads and wrenches. Some consideration was also given to the question of wire and sheet metal gages. Matters under consideration were referred back to subcommittees for a continuation of the work, and these committees will report at the next meeting.

## Welding and Cutting Blowpipes

**A** THOROUGH investigation of oxyacetylene welding and cutting blowpipes was recently conducted by the Bureau of Standards at the request of the War Department. Apparatus from 14 different manufacturers was submitted to test, and the character of the test was decided upon only after a thorough study had been made of the various operations in which these blowpipes are used.

The tests to which all the blowpipes were submitted were developed with the idea of minimizing the personal equation of the operator and securing data which were representative only of the blowpipe itself. In order to accomplish this result, a rather elaborate testing equipment, consisting of a weighing system, gage board equipment, welding table, cutting table and safety flashback testing apparatus was designed and used throughout the investigation.

This investigation is fully described in Technologic

Paper No. 200 of the Bureau of Standards, which describes in detail the various parts of the equipment and then considers the different classes of tests which were used for the cutting and for the welding blowpipes. The conclusions arrived at as a result of this work should prove of considerable assistance in improving the design of apparatus of this kind, with the object of securing better work, greater economy and increased safety to the operator.

**T**HE German Minister of Finance has given notice that owners of automobiles equipped with electric generators for lighting purposes are not entitled to receive duty-free light mineral oils. The notice does not specify what class of consumers are entitled to the duty-free fuel—owners of automobiles without lighting generators or owners of stationary lighting plants comprising a liquid fuel engine.

# Methods Used in Specialized Production of Cast Iron Pistons

Some original processes used in the production of light weight, cast iron pistons. The foundry cores are machine made. A description of the aging process and machining and inspection methods. It is claimed that the pistons are held to a tolerance of plus or minus 0.0005 in.

By J. Edward Schipper

IN making a study of production methods in use on automotive parts, it is worth while to note those in use by some of the parts specialists. There are a number of very interesting manufacturing establishments in the automotive field which specialize on one particular part and have a production sufficiently large to enable them to sell their products to manufacturers of the complete unit at a price which is less than it would cost the manufacturer to make the part himself. Often, too, these specialists take a unit and carry it to a higher state of development than it has attained in the art generally, and in that way are enabled to sell it at a price somewhat higher than what the standard article would cost the manufacturer of the complete unit to produce.

This specialized parts business is interesting from a production standpoint, because it affords opportunity for a comparison between the methods in use in such plants and those in use in plants manufacturing the complete car unit. When the production of complete engines, for instance, is large, there is very little to choose between the two, but where the production is small it is often possible for the specialist to successfully compete on a price basis, because of the greater output. From a design standpoint the specialized parts business also affords an interesting study, because it often turns out a product which is better from a performance standpoint than products which are used as stock equipment by manufacturers of complete engines or cars.

The Foster Machine Co., manufacturers of turret lathes and screw machines, have for some time specialized on the manufacture of the Foster piston. This is an internally ribbed, light weight, cast iron piston which has been extensively sold for replacement purposes. Some interesting and original processes are used in the production of these pistons. This concern does its own foundry work and delivers the pistons in either a semi-finished or finished condition.

## Core Manufacture

In manufacturing the cores for Foster pistons, a patented machine is used, which is illustrated in Figs. 1 and 2. It consists of a six-part box which is mechanically pulled out in segments, as shown. The core box is closed and filled with ordinary core sand, the box is then turned over, the segments are separated and the finished core is deposited upon a plate ready to be put in the oven. A core machine of this type is capable of making 300 cores per 8-hour day. As there are five of these machines now in operation, the capacity of the plant is 1500 cores per day. The box operates on a bell-crank lever system and deposits each core on an independent plate. Cores are baked for 2 hours in an oil oven at a temperature of 300 deg.

The castings are allowed to age for 10 days before machining operations are begun. The usual annealing process is dispensed with, it having been found that the roughing tool for the first operation peens out any internal strains. A heavy cut is taken on this tool, and after leaving it the castings are sufficiently relieved. The machine operations here described are used for all types of piston that are put through this plant. The Foster company makes 110 types of piston at the present time.

## Roughing Operation

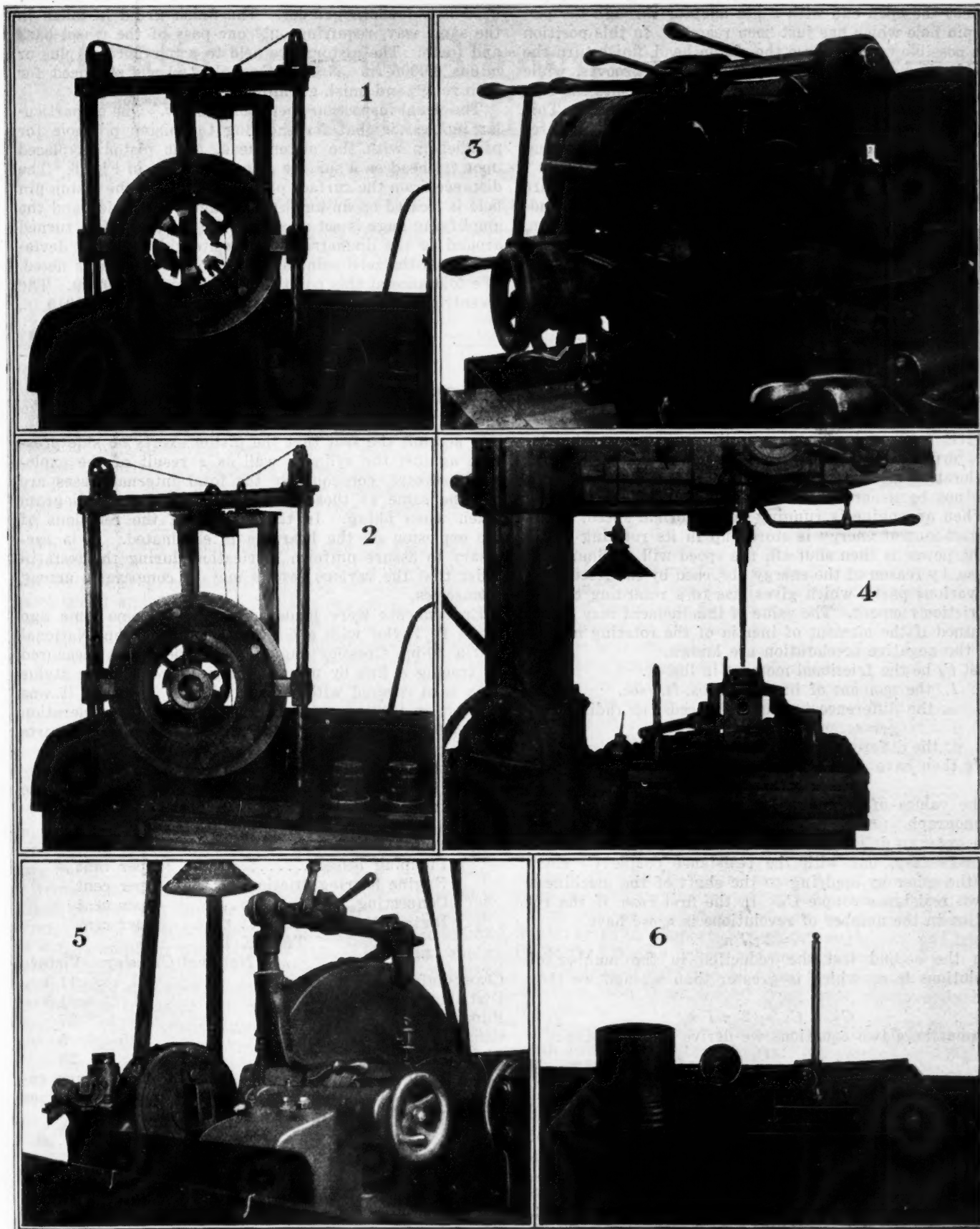
In the first roughing operation the piston is chucked at three points inside near the head and three points inside near the open end. It is driven by the piston pin boss. In this operation the piston is rough-turned, the head rough-faced and the ring grooves are roughed out. The work is done on a Foster universal turret lathe made by the same concern that manufactures the pistons. The capacity of the machine, of course, depends on the type of piston manufactured. With a piston such as that used in the Buick model D-45, the machine has a capacity of 22 per hour. This piston is  $3\frac{1}{4}$  in. in diameter by 4 in. in length. The machine takes off  $5/64$  in. all around or  $5/32$  in. on the diameter. This is a very heavy cut and requires a rigid machine. The operation set up and the machine may be seen in Fig. 3. The tool is cooled with water containing soluble oil.

Following the roughing operation, the piston is chucked by means of a Barker wrenchless chuck on its outside diameter. The open end is first rough-faced and rough-bored and then finish-faced, bored and chamfered.

All of this work is done on Foster universal turret lathes. The average time on this work is about 1.8 min. per piston for both the rough and finish operations.

The pistons are then put into a drill jig with a clamp against the open end face and a cam against the head. The work is located by means of V-blocks which fit against the bosses. While in this jig, the piston pin hole is rough drilled, allowing  $3/64$  of an inch for reaming, and the holes are also reamed. The reamer is piloted above and below the piston and in shifting over for the reaming operation, the piston is located in the jig by a drill bushing through the hole, which lines it up for the reamer. A Magic chuck is used for quick shifting over to the reaming tool. The drilling and reaming operations require about 2 minutes per piston. In carrying out this work, the operator puts through both the drilling and reaming operations without taking the piston out of the jig, eliminating any danger of shifting of the piston. Consequently, the reamer is exactly concentric with the drilled hole. The jig with the reamer in position and the drill standing by its side is shown in Fig. 4.





1—Machine for manufacturing foundry cores. Six-part box pulled out in segments. 2—Foundry core machine with core box closed. 3—Foster universal turret lathe set up to rough turn the piston, rough face the head and rough out the ring grooves. 4—Drill jig with reamer in position and drill standing at one side. 5—Modern grinder and piston with adapter inserted into the open end ready to be rough ground. 6—Surface plate for checking the piston pin hole for parallelism with the piston head

In finish-turning the pistons, the casting is clamped against the open end with a pin adapter through the piston pin hole which has just been reamed. In this position it is possible to finish-face the piston head, finish-turn the outside diameter and finish-turn the ring grooves, while at the same time a centering operation establishes the center of the piston in relation to the piston pin hole. This work is also done on a Foster universal lathe and requires 3 min. per piston. Stellite cutters are used for this and the previous cut.

Following the finish-turning, the oil drain holes are drilled and the pistons are then rough ground. In grinding, an adapter is inserted into the open end of the piston, with a pin as shown beside the machine in Fig. 5. This pin contacts with the piston boss and acts as a driver. The piston is placed between centers on this adapter and rough ground to 0.003 in. oversize, with a tolerance limit

in manufacture of plus or minus 0.0005 in. The machine used is a Modern grinder. The finish grind is taken in the same way, requiring only one pass of the wheel back and forth. The pistons are held to a tolerance of plus or minus 0.0005 in. Norton Crystolon wheels are used for both rough and finish grinding.

The usual inspection operations follow. One of particular interest is that for checking the piston pin hole for parallelism with the piston head. The piston is placed upon its head on a surface plate, as shown in Fig. 6. The distance from the surface plate to the top of the piston pin hole is located on an amplifying gage on one side and the amplifying gage is set at zero. The piston is then turned around to the diametrically opposite side and the deviation from the zero point on the amplifying gage is noted. The tolerance at this point is plus or minus 0.002 in. The eccentricity tolerance for the final inspection is 0.0015 in.

## Division of Frictional Losses in Engines

THE friction load of a gasoline engine may be determined in an easy and accurate manner by the deceleration method. The principle of this method, which may not be generally known, is as follows:

When an engine is running at its normal speed, a certain amount of energy is stored up in its rotating parts. If the power is then shut off, the speed will gradually decrease, by reason of the energy absorbed by the friction of the various parts, which gives rise to a retarding couple, or friction moment. The value of this moment may be determined if the moment of inertia of the rotating masses and the negative acceleration are known.

Let  $C_f$  be the frictional moment in lbs.-ft.

$I$ , the moment of inertia in lbs.-ft.<sup>2</sup>/sec.

$\omega$ , the difference in angular speeds, in radians per second per second

$n$ , the difference in revolutions per second per second

We then have

$$C_f = I \omega = 2\pi I n$$

The values of  $\omega$  and  $n$  are measured by means of a chronograph.

In order to determine the moment of inertia, two tests are necessary, one with the resistance couple  $C_f$  alone and the other by applying to the shaft of the machine a known resistance couple  $C_b$ . In the first case, if the reduction in the number of revolutions is  $n_1$ , we have

$$C_f = 2\pi I n_1$$

In the second test the reduction in the number of revolutions is  $n_2$ , which is greater than  $n_1$ ; and we then have

$$C_f + C_b = 2\pi I n_2$$

From these two equations we derive the following:

$$I = \frac{C_b}{2\pi(n_2 - n_1)}$$

In both tests the power is shut off when the engine is rotating at the same speed  $n$ . Then, in order to determine the friction of the different parts, a number of tests are made, first with the machine completely assembled, next with the piston removed, then with the distribution gear disconnected, etc. The tests should be made under normal operating conditions as regards lubrication, speed and temperature.

The engine being completely assembled, it is run at normal speed by the explosion of the gaseous mixture. After the connecting rod head is disconnected, it is run by an electric motor. However, when there are no explosions in the engine cylinder, it is necessary to take

into account the fact that the piston exerts no side pressure against the cylinder wall as a result of the explosion pressure, consequently the total internal losses are not the same as those shown by an indicator diagram taken when idling. In the same way, the reactions of the explosion on the bearings is eliminated. It is necessary to assure uniform lubrication during the tests in order that the various results may be comparable among themselves.

Experiments were made in Australia some time ago by F. P. Taylor with a 6-hp. National, a 40-hp. National and a 30-hp. Crossley engine. The speed was measured by tracing a line by means of an electromagnetic stylus on a card covered with lamp black. In this way it was possible to trace a curve of speeds, and the deceleration was determined by drawing tangents to different parts of the curve.

The results obtained from tests on these engines permitted of a comparison of the individual losses in the different engines, which is made in Table I.

On the average the division of losses is as follows:

Piston friction .....	45 per cent
Pumping losses .....	35 per cent
Engine bearing friction.....	14 per cent
Connecting rod .....	4 per cent
Distribution gear .....	3 per cent

TABLE 1.

	National	Crossley	Victor
Crankshaft bearings .....	15	16	11.5
Distribution gear .....	2	4	1.5
Pumping loss .....	34	37	37
Connecting rod .....	4	3.5	5
Piston .....	45	40	25

While all three of these engines were stationary engines, the distribution of losses in automotive engines would no doubt be very much the same.

A TRADE organization for the British rubber industry has been created, known as the Institution of Rubber Industry. It plans to promote the interests of rubber growers, manufacturers and distributors, and to advance the general standards of the rubber industry. At the inaugural meeting of the new body it was brought out that the rubber industry was substantially a century old; in 1873 the world's production of rubber amounted to 15,000 tons, while in 1919 it reached nearly 400,000 tons.



# Traffic Facts Shown by Highway Transportation Surveys

Overloading is prevalent in hauling all commodities. Trucks handle large percentage of manufactured products carried over route covered by surveys. 3.2 passengers per car is average determined. 2-ton trucks form 16 per cent of total. Census an example of needed transport studies.

**T**HE practice of overloading trucks is prevalent in the carrying of all commodities, according to the results of two recent traffic surveys conducted by the Connecticut Highway Department in cooperation with the Bureau of Public Roads. Other interesting data were developed in the surveys which form the beginning of actual studies in the economics of highway transport. Information was developed concerning the percent of total vehicles comprised by trucks of a given weight, the average length of haul of the various commodities, truck weights per inch of tire width, and a comparison of truck and railroad traffic.

While this data cannot be considered as final in any sense, the method and type of the survey illustrates well how the needed information on highway transportation can be compiled and analyzed. For this reason the story of these two traffic censuses are of special value. The purposes of the censuses were to determine the economic value of the highway; the classification of vehicular traffic; the gross weight and wheel loads of motor trucks and the extent of overloading; a basis for the distribution of construction and maintenance costs; density of traffic; width of vehicles and the relation of density and width of vehicles to roadway width; the movement of freight by highway; the speed of vehicles and to serve as a basis for a formulation of traffic regulations.

The first census was taken during the last two weeks of August on the Hartford-Springfield road at the Massachusetts-Connecticut State line. The second census took place during October on the Boston Post road at the town of Greenwich, Connecticut. Each of the censuses covered a period of fourteen days. The daily survey covered ten hours, rotated so as to determine the traffic movement at the earlier and later periods of the day. Two night counts were conducted to form the basis for an estimate of night traffic. Road scales were installed on both roads to weigh the traffic as it passed over the road. At the Greenwich station a 49,000 pound automatic Fairbanks scale was used in order to delay the traffic as little as possible.

During the first census traffic bound south from Springfield, Mass., to Hartford, Connecticut, was weighed whether empty or loaded. North bound trucks were stopped, but only commodity information was obtained. The density of traffic was such that it was impossible to weigh trucks going in both directions. In the second census the east bound traffic from New York was weighed and west bound trucks were stopped only for commodity information. The personnel of the survey included eight men to handle both truck and passenger car traffic. During the second census older men were employed and the results, especially the truck information, were more accurately recorded. Traffic was only slightly delayed by the observers and drivers cooperated willingly when they understood the purpose for which the information was asked.

During the first census the information, including the weight of the truck was obtained in an average of one minute and forty-one seconds, the longest time being two minutes and fifty-five seconds and the shortest one minute. At different times during the census speed tests were made and one of the results of the survey is the indication that a more accurate index of truck speed can be obtained at a place a few miles from the traffic station where drivers will not suspect that the test is being made.

Five forms were devised for use in recording the data, copies of which are attached.

The cost of the first census was \$1,693.10, of which \$977.63 was for the scale, \$170 for the cost of erecting it, and the balance for salaries of the observers. The cost of the second census was \$3,331, of which \$2,700 was for the scale and the balance for salaries of observers, etc.

The report on the censuses is divided into four parts. Part one is in the nature of an introduction. In part two are covered analyses of the best methods of obtaining such information and of the passenger traffic recorded and a study of the extent of truck overloading. Part three deals with an analysis of commodities carried, and part four has to do with a study of the relation of highway traffic observed to railroad traffic in the same section.

## Passenger Traffic Analyses

28,011 passenger cars were recorded during the first census and for 14,036 of the cars observed the records were analyzed to determine the average haul, number of passengers, etc. In the second census 38,566 passenger cars were recorded and the records of 5023 were analyzed.

The number of motorcycles and horse-drawn vehicles was so small in comparison with passenger cars and truck traffic that their numbers are not reported.

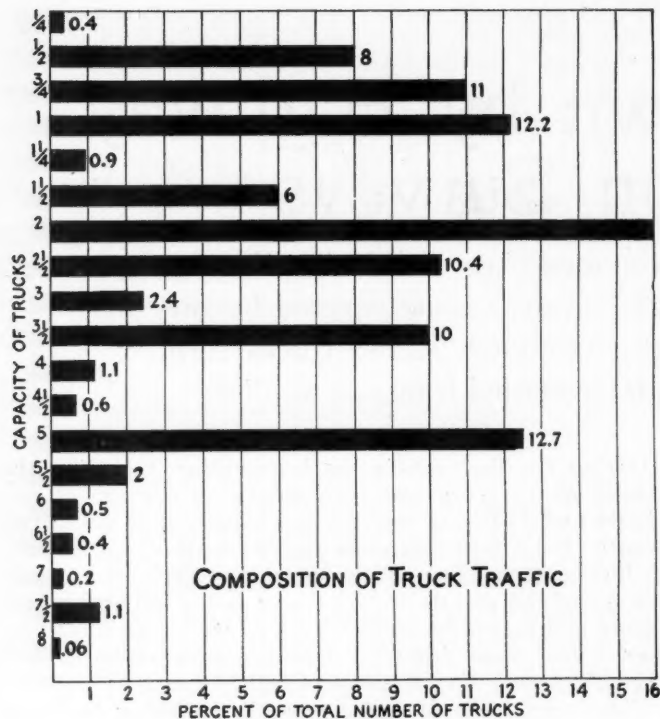
All makes of cars and all types including touring cars, roadsters, and other special types were observed during the census.

44,950 passengers were transported in the observed cars, south bound in the first census. An average of 3.2 passengers per car. During the first census of the licenses observed 50.5 per cent of the total were Massachusetts tags; 34.9 per cent were Connecticut; 7.2 per cent were New York, and 7.2 per cent were miscellaneous.

The location of the census station near the Massachusetts-Connecticut State line and the fact that this analysis relates to south bound traffic accounts for the high percentage of Massachusetts cars.

In the second census the average number of passengers per car was found to be 3.314. The analysis of license tags shows Connecticut with 53.1 per cent; New York 37.4 per cent; Massachusetts 3.2 per cent; New Jersey 3.2 per cent. A daily average of 6739 passenger cars was found for the two censuses while the daily truck average was 792.

The principal movement occurred between seven o'clock



in the morning and eight in the evening, the peak load occurring at five P. M. The hourly density of truck movement from eight P. M. to five A. M. indicates the night movement of regular truck lines. During this interval an average of thirteen trucks passed over the roads per hour.

In the first census the daily average of passenger car movement for twenty-four hours was 2907. The average mileage per car was 70.018 at 3.2 passengers per car, and figuring the value of the passenger service rendered at the railroad rate of 3.6 cents per mile the passenger service on the Hartford-Springfield road during the two weeks was valued at \$327,595.50.

During the second census the daily average of passenger car movement for twenty-four hours was 3832.4. The average mileage was 52.4. Computing the value of the service as above the value for the two week interval was \$355,417.04. On the two roads together the value of the service rendered for a year would be \$17,238,326. This figure is merely the value of the service rendered by these two roads estimating the value at railroad rates. It is not the cost of the service rendered by the roads.

### Truck Overloading

The truck weight data from both censuses were analyzed to determine the wheel and axle loads and to ascertain what percentage of the vehicles weighed in excess of the legal limitation of 25,000 pounds, and what part of the traffic consisted of vehicles with wheel loads greater than 800 pounds per inch of tire width, and what proportion of the vehicles was overloaded when gauged by the capacity rating of the manufacturers. The latter practice is referred to as overloading per capacity. The weight standard used in determining overloads for each make and capacity consists of a summation of the manufacturer's 1920 weights for the chassis, body, and rated capacity, giving the total weight when loaded to rated capacity. The percentage distribution of weight recommended by the manufacturers of trucks for front and rear axle load was used as a standard for computing overloads on the front and rear axle. To be conservative 5 per cent of the total chassis, body and capacity weight was added to the manufacturer's given weight in deriving the standard for com-

puting overloads. One half of this 5 per cent was added to the front and rear axle weights in arriving at a standard for measuring overloads per axle.

The practice of overloading per capacity is not confined to loads of heavy material such as sand, gravel, brick etc.

It is restricted to no typical group of commodities, but is almost universal.

Apples, beer, butter and eggs, drugs, fish, furniture, groceries, lumber, meat products, paper, rubber goods, sugar, vegetables, wire are typical commodities of which overloads per capacity were noted.

Of the cases of overloading per capacity observed, 75 per cent was practiced by regular trucking vehicles, 25 per cent by irregular trucks.

Commodity loads exceeding 25,000 pounds were noted in the case of such commodities as brick, butter, drugs, eggs, glass, groceries, litharge, meat, plumbing supplies, sugar, vegetables and vinegar.

Of the number of loads exceeding 25,000 pounds 87.8 per cent were overloads per capacity; 88.7 per cent were by regular trucking companies. Thirty-nine out of 41 cases were loaded from 846 to 1560 pounds per inch of tire width on the rear axle.

Only 4.2 per cent of the trucks observed were over 5-ton capacity. The percentages of other capacities noted were as follows:

Capacity in tons	Per cent of total number	Capacity in tons	Per cent of total number
1/4	0.4	4	1.1
1/2	8.0	4 1/2	0.6
3/4	11.0	5	12.7
1	12.2	5 1/2	2.0
1 1/4	0.9	6	0.5
1 1/2	6.0	6 1/2	0.4
2	16.0	7	0.2
2 1/2	10.4	7 1/2	1.1
3	2.4	8	0.6
3 1/2	10.0	...	...

### Width of Truck Bodies

The least width of truck body observed in the two censuses was 5 feet; the greatest width in either census was 9 feet, 6 inches. Only 6 per cent of all trucks observed in the first census and 5 per cent in the second census were equipped with bodies exceeding 7 feet, 6 inches in width.

Pneumatic tires were observed in use principally on the lighter trucks; solid tires on the heavier trucks and a combination of pneumatic and solid on the front and rear wheels respectively principally in the weight classification from 3000 to 14,000 gross weight in pounds. The use of pneumatic tires increases rapidly from 2000 to 5000 lb. and then decreases rapidly to 10,000 lb. The number in excess of 10,000 lb. is negligible. The greatest percentage of trucks equipped with pneumatics occurs in the 4000 to 5000 lb. class. Solid tires begin to increase rapidly at 5000 lb.

The density of movement was found to be between the 4000 and 14,000 lb. classes, 1378 out of 2183 observed trucks falling in these classes. Only 51 out of 2183 or 2.3 per cent exceeded 25,000 lb. Only 7 out of 2183 weighed more than 28,000 lb.

In the first census 29 of 2266 trucks, 12.8 per cent were found to have front axle loads in excess of 800 lb. per inch of tire width.

138 out of 359, 38.44 per cent were found to have rear axle loads in excess of 800 lb. per inch of tire.

167 of 585 or 28.55 per cent were loaded to more than 800 lb. per inch of tire width on both axles.

Overloads on the rear axle range from 800 to 1100 lb. per inch, density occurring at 900 lb.

Overloads on the front axle range from 800 to 1650 lb. per inch, density occurring at 1100 lb.



In the second census the per cent and range of overloads were as follows:

Front axle .....11.9 per cent, 800-1500 lb., density 950 lb.  
Rear axle .....36.5 per cent, 800-1925 lb., density 1100 lb.  
Both axles.....24.6 per cent

In both censuses the number of overloads increases as tire thickness increases to 1½ inches and decreases above that thickness.

The weighted average overload per capacity (computed on basis of standard defined on page 5) is 39 per cent. This is construed to mean that every third truck was loaded beyond the capacity of the truck and tires. A total of 37.5 per cent were overloaded on the rear axle, and 40 per cent were overloaded on the front axle.

#### Recommendations Based on Overloading Analysis

1. Classification of highways.
2. Seasonal restriction of loads.
3. Prohibition of overloads per capacity, and restriction of tire to 800 pounds per inch width.
4. Maximum body width of 7 ft. 6 in.
5. Maximum axle loads to be determined for each make and class of trucks and placed in conspicuous place on the vehicle.

#### Commodity Analysis

The 20 commodities noted in greatest bulk in the second census, with the weight and average haul of each, follow:

Commodity	Weight in pounds	Average haul in miles
Groceries .....	1,039,469	44.15
Furniture .....	553,545	71.47
Beer .....	421,665	72.92
Sugar .....	404,640	47.26
Household goods ...	375,495	99.81
Meat products .....	334,410	42.75
Rubber goods .....	279,020	82.96
Vegetables .....	176,893	37.68
Poultry .....	159,760	32.67
Cocoa beans.....	158,518	33.12
Merchandise .....	153,831	42.88
Wire .....	145,550	66.50
Grapes .....	141,220	48.56
Bananas .....	133,627	47.13
Dry goods .....	133,360	43.79
Feed .....	131,140	27.10
Silks .....	125,305	110.22
Lumber .....	119,805	35.51
Machinery .....	115,875	89.10
Litharge .....	114,370	106.25

The longest average hauls reported were those of boats

and yeast, each of which was hauled an average distance of 150 miles. The volume of these commodities hauled were: Boats, 840 lb.; yeast, 10,445 lb.

The shortest haul reported was that of charcoal, 2150 lb. of which were hauled an average distance of 3.50 miles. The next shortest haul was milk, 4725 lb. of which were hauled an average of 5.80 miles.

Agricultural products make up only 14.3 per cent of the traffic in the second census; manufactures and miscellaneous 72.5 per cent, indicating, according to the report that truck movement in Connecticut is predominantly that of manufactured goods of high value and small bulk.

Because the survey was limited to one season all agricultural products are not represented in the list of commodities. The average haul of agricultural commodities is 39.5 miles; the longest, eggs, is 68.21 miles.

Extending observed weights and hauls during the period of the second census it is estimated that the annual ton-mileage of agricultural commodities is 86,649.

Estimated value of agricultural products hauled both ways over Boston Post Road at Greenwich, based on observations of the second census, \$15,075,000.

#### Comparison of Truck and Railroad Traffic

Comparing the truck traffic observed in the second census with traffic over the New York, New Haven & Hartford and Boston & Maine Railroads, the results are as follows:

	By Truck	By N. Y., N. H. & H. (1918)	By Boston & Maine (1920)
Products of Agriculture ...	14.3	9.4	11.8
Product of Animals .....	11.2	3.3	3.2
Product of Mines .....	0.5	42.5	36.8
Product of Forests .....	1.5	6.5	13.2
Manufacturers and Miscellaneous .....	72.5	38.3	3.50

Total observed east-bound truck traffic, second census, 239,562 ton-miles.

Adjusted to give 24-hr. traffic for the 2-week period, 360,000 ton-miles, eastbound.

71 per cent of east-bound traffic loaded.

36 per cent of west-bound traffic loaded.

Estimated traffic both ways for 2-week period, 540,000 ton-miles.

Assuming this traffic to be average for year the annual east and west movement at Greenwich is estimated at 14,040,000 ton-miles of pay freight.

The average haul of truck movements was 47.44 miles.

## A Census of the Petroleum Refineries in the United States

PETROLEUM refineries in the United States on January 1, 1922, numbered 479 completed plants, with 30 additional plants in process of construction, according to a statistical summary prepared by H. J. Lowe, petroleum economist of the Federal Bureau of Mines. The indicated daily refining capacity of these plants is 2,164,050 barrels of crude oil.

The tremendous increase in the extent of the petroleum refining industry of the country is shown by the fact that in 1914 but 176 petroleum refineries had been completed. Within eight years the number of refineries has been increased by 172 per cent.

Texas at present leads all other states in the volume of oil refining business, with 63 operating plants, with a daily capacity of 345,150 barrels; in addition, the state had on January 1, 46 refineries in shut-down condition, while 9 other plants were being built. Oklahoma is the second state in number of refineries, with 54 operating and 43 shut down; operating plants in this state had a daily capacity of 234,650 barrels. California, with 34 operating plants, was refining 314,360 barrels daily.

Pennsylvania had in operation 48 plants, with a daily refining capacity of 114,930 barrels. New Jersey, with but 5 refineries, treats 224,000 barrels of oil daily.

The importance recently attained by the state of Louisiana in this industry is indicated by the fact that 14 refineries were treating 114,350 barrels daily, while 11 plants were in shut-down condition. Kansas, with 19 operating plants, was refining 57,650 barrels daily; Illinois, with 12 plants, was handling 62,050 barrels; Wyoming, with 11 plants, was refining 89,900 barrels; and Indiana, with 5 plants operating, was handling 54,300 barrels daily.

Of the 479 completed refineries in the United States, 154 were in shut-down condition at the first of the year. The daily refining capacity of these non-operative plants was 254,610 barrels, or approximately one-eighth of the entire refining capacity of the country. The 30 new plants in process of construction will, it is estimated, add 59,950 barrels to the country's daily refining capacity.

Copies of the directory of petroleum refineries in the United States may be obtained from the Bureau of Mines, Washington, D. C.

# Automotive Industry Organizes for International Trade

Foreign trade will absorb from 5 to 15 per cent of American automotive production. This may mean the difference between profit and loss. The trade associations have recognized the practical help that can be given by the Automotive Division of Bureau of Foreign and Domestic Commerce. This report presents information of vital importance to manufacturers.

**A**UTOMOTIVE transportation is an international institution. Automobiles, motor trucks, motorcycles, motor boats and aircraft provide the transportation so necessary to modern civilization.

The introduction of the internal combustion engine is fraught with more significance than any other recent development in the great territories of North and South America, Europe, Africa, Asia and the Pacific. Just as the steamboat, the locomotive and the telegraph were the vehicles that brought about the world upbuilding of the nineteenth century, following the devastation wrought by the long Napoleonic conflicts, so will the automobile, the airplane and the motor boat guide the twentieth century and speed up the economic development that must follow the World War.

To the automotive industry of America has fallen the leadership and the direction of this world wide need for transportation. The American industry alone is prepared to supply the essential passenger cars, motor trucks and attendant equipment. Its ability to build and produce these vehicles places upon it an obligation of education and service far transcending the continental limits of the United States.

America has a duty and an opportunity. It is her commercial destiny not merely to export American-made automotive vehicles and equipment but to bring to the entire world the benefits of efficient transportation on the road, in the water and through the air.

This report has been prepared by the international trade committees of the several associations having to do with the manufacture and distribution of the various automotive products. The purpose is to explain something of the assistance that may be accorded them in building up their international sales. The belief of the committees of these associations and the sub-committee preparing this report is that our industry cannot longer delay in taking its rightful place in this world movement. Other countries naturally will find it worth while to take advantage of the production facilities which have been so highly developed in this country during the last two decades.

Each company and each firm, no matter how large or small, should investigate the possibilities for the use and sale of its products in these other countries. Many companies, it may be found, have no place in this trade, as the character of their products, the volume or production or other conditions may not warrant more than a local merchandising effort. But to numerous others a definite volume of international sales seems assured if they will but make an honest and careful campaign to obtain it. To such firms, this report is directed.

The value of this trade is two-fold. The first is that

it will absorb a certain percentage of production—5, 10, 15, perhaps 20 or 30 per cent—in any event, the final proportion that may mean the difference between profit and loss. Secondly, it insures a definite volume of monthly production. Sales seasons differ throughout the world. When the curve of demand is falling in the northern countries the change in season swings the sales upward in territories south of the equator, thus assuring a more continuous production than is possible if only one territory is cultivated.

The question is not so much as to the value of international trade but as to how it may be obtained. Thus we come to the real purpose of this report, which is to explain the work and the activities of the Automotive Division of the Bureau of Foreign and Domestic Commerce, organized under the Bureau of Commerce to aid in the enlargement of the international sales of American-made automotive products.

The object of the Bureau is to collect and disseminate information on the various markets and to lend every hand in the promotion of commercial relations between this and other countries. Previously the Bureau consisted only of regional, technical and service divisions, but, in 1921, to these older divisions were added an additional twelve, each of which embraces a special commodity, such as agricultural implements, rubber (including tires), electrical equipment, fuel, foodstuffs, lumber, textiles, etc. Naturally, because of the great strides already made in the international field by the American automobile, one of the new divisions concerns itself with automotive products.

Under this division fall passenger cars, motor trucks, motorcycles, marine engines and motor boats, airplanes and aircraft, with, of course, the parts, units, accessories and service equipment that go with them. These products constitute the automotive industry and it is the development of their use for which the Automotive Division is working.

An outline of organization shows Herbert Hoover, as Secretary of Commerce, the head of the Department of Commerce. Under him is the Bureau of Foreign and Domestic Commerce, directed by Dr. Julius Klein, with the Automotive Division as one of its component parts. This division is directed by Gordon Lee with M. H. Hoepfli as assistant chief.

The organic act which created the Bureau provides that its name shall embrace both foreign and domestic commerce, but that is almost a misnomer, at least so far as the present work of the Bureau and of the Automotive Division is concerned. Its activities are entirely directed to the promotion of foreign commerce, although this requires constant contact and work with manufac-



turers and distributors at home. Later, it is expected that some phases of the domestic trade will come under the bureau activities but, as now functioning, it is exclusively devoted to the upbuilding of overseas business.

The Bureau and the Automotive Division act solely in an advisory capacity, furnishing information upon which American manufacturers and distributors may obtain international outlets. To understand the extent of this information, a review of the established contacts throughout the world and at home is essential.

There are in other countries approximately 1000 official representatives of the American government, these being commercial attaches and trade commissioners in the larger centers, consuls and consular representatives. These representatives are co-operating wholeheartedly in the work of the Division. An automotive trade commissioner is now traveling in the Far East and another will leave shortly for Europe. Each of these thousand or more officials is transmitting up-to-the-minute and thoroughly reliable information back to this country for clearance to the industry through the various channels that are being provided. In addition to their reports, the Division is receiving a vast amount of material from unofficial sources, from business publications and daily newspapers published in other countries and from travelers and visitors who come in contact with the Division and its representatives, either at home or abroad.

These reports provide surveys of the trade, including past, present and potential developments. Statistical information is supplied regarding registration, importation, exportation, etc., and other reports, frequently by cablegram, are regularly received regarding current market conditions, significant developments and trade opportunities. The material is transmitted to the Automotive Division either automatically and at stated intervals or upon special occasion. When a tender is offered, for instance, for motor trucks in Brazil, Spain or Japan, or for motorized fire fighting equipment or airplanes in Bombay, Buenos Aires or Capetown, full information concerning it is sent to the Division, either by mail, or, if the time is short, by cable and is then supplied at once to manufacturers and distributors here. Dozens of such inquiries are being received each week from numerous countries covering all automotive products, ranging from aircraft to accessories and service equipment.

Questionnaires dealing with local registration dis-

tribution channels, dealer establishments and other similar topics have been or are being submitted to all overseas representatives. The registration questionnaire, as an example, provides for a careful and authoritative world census on passenger cars, motor trucks, motorcycles, airplanes and fire fighting equipment. Returns from it are being tabulated as they are received, district by district, the results being made public from time to time. This census will prove of immense value

to motor equipment manufacturers in laying out and planning their sales campaigns and it will enable them to picture the markets as they exist at present or may be expected to develop in the years to come.

Monthly reports are being received, by cable, from the important territories, these reports being both general and specific in nature. The Department representatives review the economic, agricultural, financial and industrial conditions in each territory, thus drawing a conclusive showing of the possibilities of that market for immediate or future business. A recent step forward is the enlargement of cable service so that each of the monthly cable reviews will give specific information on automotive conditions. It must be remembered that the automotive industry is in the forefront of American industries having international possibilities and this special reference in the cable reports was deemed essential as a merited recognition of its importance.

The world stands in great need of American automotive equipment. The passenger car and motor truck and other equipment that has negotiated the roads of Kansas, Missouri, Oklahoma, Iowa or Nebraska, is likewise the vehicle best suited to overcome similar conditions and to give the maximum of service in Mexico, Patagonia, South Africa, India and other countries. This committee believes that nowhere else are produced the automobiles, airplanes, motor boats and motorcycles, regard-

less of price class, quality, durability or finish, that comprise the American output and it likewise believes that these are the products that must fill the myriad transportation needs of practically every territory. The airplane was invented in America and the automobile, the motor truck and the motor boat were brought to their present high standard of efficiency and value through the development that has taken place in this country. Nowhere else has the conception been held that the automobile is a vehicle of transportation and nowhere else has it been so perfected. Consequently the American

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**T**HIS report outlines the opportunities available for American automotive manufacturers in international trade and shows how practical commercial assistance is being given by the Automotive Division of the Bureau of Foreign and Domestic Commerce, under the direction of Gordon Lee.

The report was prepared under the direction of the following representative committees:

**National Automobile Chamber of Commerce:**  
J. Walter Drake (Hupp Motor Car Corp.), chairman, and George F. Bauer, secretary, Foreign Trade Committee, 366 Madison Avenue, New York City.

**Motor and Accessory Manufacturers' Association:**

W. O. Rutherford (B. F. Goodrich Co.), chairman, and M. Lincoln Schuster, secretary, Foreign Trade Committee, 33 West 42d Street, New York City.

**Automotive Equipment Association:**

S. D. Black (Black & Decker Mfg. Co.) and Graham W. Brogan (Black & Decker Mfg. Co.), Foreign Trade Committee, City Hall Square Building, Chicago.

**Aeronautical Chamber of Commerce:**

Luther K. Bell, 501 Fifth Avenue, New York City.

**Motorcycle and Allied Trades Association:**

W. G. McCann (Hendee Mfg. Co.), chairman, Foreign Trade Committee, Springfield, Mass.

**National Association of Engine and Boat Manufacturers:**

Ira Hand, secretary, 29 West 39th Street, New York City.

**Association of Automotive Equipment Manufacturers:**

Noah Van Cleef (Van Cleef Bros.), chairman Foreign Trade Committee, and W. E. Green, secretary, 3222 Washington Blvd., Chicago.

**The Class Journal Co.:**

George E. Quisenberry (El Automovil Americano), 239 West 39th Street, New York City.

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automobile stands upon the threshold of a world use so large that its possibilities can be little more than imagined. As we have built up our home demand and as we have evolved its many uses—from the Atlantic to the Pacific and from the Great Lakes to the Rio Grande—so also is the remainder of the world looking for the simplified but meritorious automotive vehicle of American design to furnish the transportation needed in city, town and rural district.

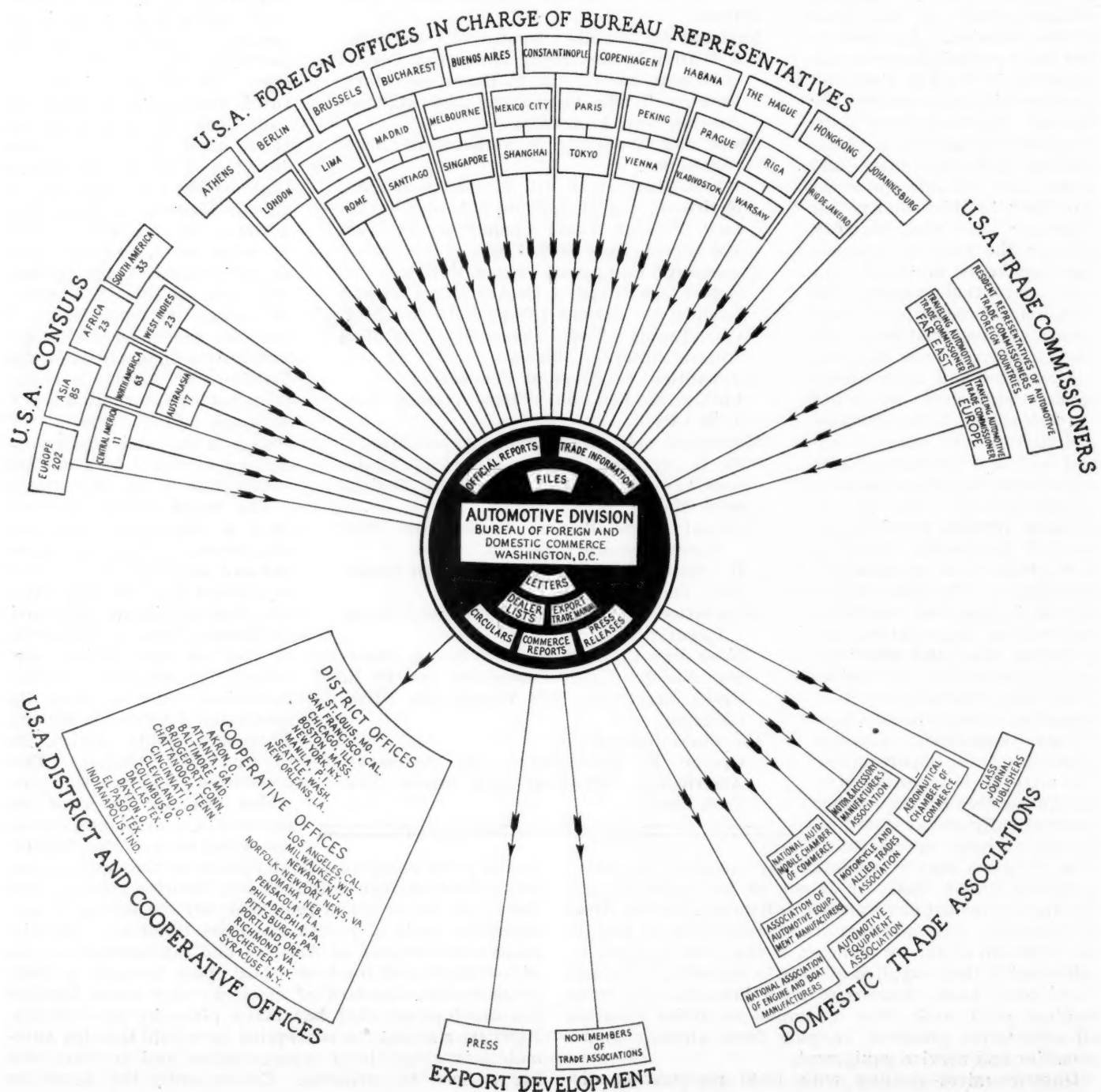
The Automotive Division is seeking to bring back the picture of these developing markets so that full advantage may be taken of the numerous opportunities for trade that are being offered. Let us go further into the manner in which the Division functions.

The information gathered from all overseas centers must be transmitted to the trade if it is to have any value. Some of the material is of no practical value and naturally is discarded. A part is not suited for publication but is valuable for reference purposes and is in-

corporated into permanent files. Some is confidential or semi-confidential and distribution must be guarded accordingly. Other material is released at once to the automotive business papers, the daily press or is published in other form. The large bulk of all the information finds immediate transmission to the trade.

The first contact of the Division with the industry is through "Commerce Reports," the weekly publication of the Bureau. It contains an automotive section, together with a resumé of conditions in the different centers and a list of trade opportunities or leads for immediate business. This committee recommends to all interested firms or individuals a subscription to this report.

A second contact is through the Exporters Index. To all firms properly listed on the index, confidential bulletins and lists of trade opportunities are sent from day to day as they are received. Only firms of undoubted American foundation and standing are placed in the index by the Department of Commerce. This committee





recommends that all companies avail themselves of this opportunity. Information concerning it and the proper blank forms for listing may be obtained either from the committees of the various associations or direct from the Division.

Lists of overseas dealers also are in process of formation and will be supplied upon request. Lists of this nature previously furnished have given little information upon which a manufacturer or exporter might base a sales campaign, but this fault is being corrected and those now coming from the Division contain many more facts than formerly was the case.

Reference files of the Division are also open to the trade. Of primary importance are those under such general subjects as:

Aircraft	Sales Promotion
Automotive Transportation	Miscellaneous
Statistics	Parts and Accessories
Markets	Automobiles
Service	Motor Trucks
Legislation	Customs
Motor Boats	Contingent Factors
Transportation Possibilities	Distribution
Production	Preferential Specifications

These files are subject to indefinite expansion and are so flexible as to permit the establishment of numerous sub-headings. Key indices are kept so that reference to all subjects is readily possible and the Division is building up a library containing automotive reference books and business journals. Furthermore, the Division is preparing special reports upon each territory, with distribution points outlined, potential demand, customs, preferences, tariffs, etc. Many of these reports, some specifically considering road and highway construction, have been brought out and others are in the hands of printer or are nearing completion.

Tariff laws and special regulations of each country are being studied for their import to the industry and special bulletins upon these subjects are promised within a short time. This committee believes that American manufacturers, distributors and exporters will find the files, libraries and reports of utmost importance in regard to whatever international campaigns may be under way.

The Division, if its full value is to be returned to the industry and if the industry is to profit from it according to the full opportunities presented, must be considered as being other than an academic institution. That it is not academic will be borne out amply by any contact and regardless of any preconceived notions that may be held because of its location at Washington and its organization under a government department. This committee believes in the work of the Division only after a full investigation and because of what it already has completed or has instituted.

Gordon Lee, the chief, came to the division from the industry itself, his appointment having been largely at the direction of the National Automobile Chamber of Commerce. Lee has been associated with the industry for years and was a member of the family of George B. Selden, the inventor of the automobile. Aside from extensive domestic experience in the manufacture, distribution and sale of motor cars, trucks and motor tractors, he has traveled extensively abroad as an automotive representative. Since his appointment in 1921, Lee has made various trips to the automotive centers and is thus keeping in close touch with developments in the domestic field, this naturally being necessary for a proper survey of the international markets.

Much of the organization work of the division has

been in the hands of M. H. Hoepli, assistant chief of the Division. Previous to his present work, Hoepli was executive research assistant for one of the largest American automotive corporations. In addition he has had first hand experience abroad.

Much of the information collected by the Division will be distributed to the various manufacturers through the associations of which they are members and by the automotive business papers. These contacts have already been formed by the Division through the associations previously listed.

International trade bulletins already are being sent out to all members by the National Automobile Chamber of Commerce, the Motor and Accessory Manufacturers' Association and the Aeronautical Chamber of Commerce. Arrangements for similar bulletin service are being considered by the Automotive Equipment Association, the Motorcycle and Allied Trades Association and the National Association of Engine and Boat Manufacturers.

Thus it will be seen that the American industry is advantageously situated to take its proper place in the international automotive development. This committee believes that the Automotive Division of the Bureau of Foreign and Domestic Commerce will prove of immense help in aiding and guiding the industry in matters pertaining to international sales. Subjects of practical importance at the time of writing include the following:

The fostering of wider and cheaper distribution of gasoline and kerosene.

The use of alcohol as a motor fuel in those territories where it may be produced economically.

The upbuilding of service and distribution facilities.

The promotion of local automobile shows and expositions.

The furtherance of good roads and highway improvement.

The development of motor bus, passenger and freight carrying lines.

The establishment of commercial aviation projects.

The extension of motor boat use.

To these may be added the production and exhibition of motion picture films explanatory of the American automotive idea, the packing of international shipments, the organization of automotive dealer associations in the various foreign centers and the participation by manufacturers and distributors in merchandising, servicing and financing all automotive products.

The committee believes that the international markets offer wide possibilities for the many American firms which will intelligently and honestly seek its development. The committee believes likewise that the best ideals and the highest integrity of American business should be maintained and safeguarded at all times in this international commerce.

The world's needs for transportation have been little more than touched and the coming months and years are so fraught with promise that this committee hopes every real American firm will investigate without delay and determine what position it should occupy in this great business.

ACCORDING to German patent No. 810,261, to the Badische Anilin and Sodafabrik, rust can be removed from iron parts by treating them first with a dilute acid solution and at the same time or later on with a mixture made up of an emulsion of oil or grease, as, for example, 80 parts of water, 20 parts of hydrochloric acid of 20 deg. Baume and 25 parts of a 10 per cent mineral oil emulsion. The iron parts remain in the bath until the rust disappears and they are then rinsed and dried.

# Practical Progress in S. A. E. Fuel Research Program

Fuel research is being carried out in four parts. Tests are under way at Bureau of Standards, and at a number of automobile plants. Purpose is to determine what sort of fuels, as regards volatility, will give the average operator most transportation miles per barrel of crude oil used.

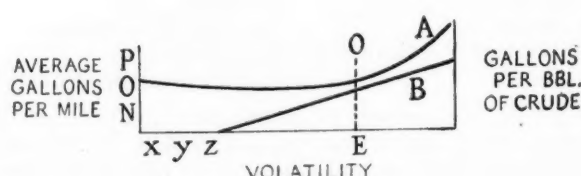
THE automotive industry recognized some time ago the necessity for a careful study of the fuel problem. Viewed from the standpoint of the automotive executive the fuel question may properly be stated as follows:

"What sort of fuels, as regards volatility, will give the average operator the most miles of transportation per barrel of crude oil used in the production of this fuel?" Or, in more technical terms, "What are the relations between fuel volatility, fuel consumption of the average vehicle, and fuel produced per barrel of average crude?"

We know that increasing end-point increases the available number of gallons of motor fuel, supposedly decreasing the cost per gallon, and that it qualitatively increases the average consumption, thus tending to increase the total cost of fuel. Neglecting for the moment other ill effects, it is obvious that there is here involved a broad question of economic balance. When adding heavy ends increases the number of gallons consumed more than the cost per gallon, we lose.

We may expect both industries to be best served when the motor gasoline produced from a barrel of crude de-

To put the question in such a form that it will indicate the technical answer we require, we may consider two curves:



Curve A has some such form as is shown. Fuel consumption goes up at an increasing rate as volatility goes down. But we know nothing as yet about numerical values of the co-ordinates. Curve B should be more easily determined. Refining figures can show how much motor fuel of any given volatility can be produced from an average barrel of crude by any selected process. An answer to the above question requires both of the curves A and B plotted together. This shows that there will be some point, O, beyond which the increase in consumption exceeds the increase in production. At about this point the total cost of fuel will increase.

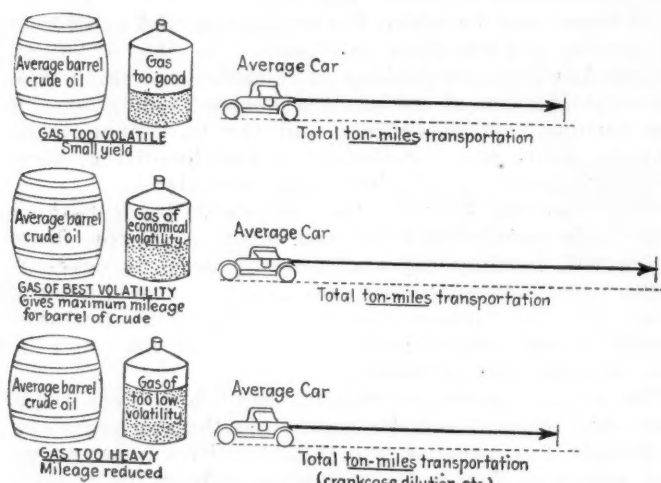
A systematic research program to accomplish the desired result has now been started, under the supervision of the Research Department of the Society of Automotive Engineers, which department will compile the results of the tests as well. This research program may best be described briefly in four parts:

## 1. Preparation of fuels.

Several of the refineries have made up batches of experimental motor fuels, the volatility of which has been decided upon after careful consideration. Four fuels are to be used, ranging in volatility from aviation gasoline to the heaviest which can be used in practical service. The U. S. Bureau of Mines is in charge of the specifications for these fuels and will make tests as to their quality, as well as control tests on fuel samples to be submitted by the various companies running the tests.

## 2. Road-laboratory tests of vehicles.

The United States Bureau of Standards has prepared a program of road tests to be made on each of the half dozen models of passenger cars representing the largest production. For the purpose of these tests, a most complete layout of indicating and recording instruments has been specially designed and built at the bureau by means of which accurate records of fuel consumption and all elements of car performance can be made under all conditions of normal road service. Thus the effect of the experimental fuels on both car mileage and car performance will be accurately known.



Maximum ton-mileage depends upon the correct fuel volatility. Therefore we must find what this correct volatility is.

livers the most mileage to the average vehicle. The accompanying drawing illustrates this point.

A barrel of crude oil will produce more or less gasoline, depending upon its volatility. If the volatility is correctly chosen, the total ton-miles of transportation per barrel of crude will be a maximum. If unnecessarily volatile, the amount of fuel will be small and the mileage less. If too poor, while the quantity of fuel will be larger, the miles per gallon will be less and the total ton-miles will be again less than the maximum.



## 3. Service road tests of vehicles by manufacturers.

A number of makers of the cars representing the largest production are each to put through a road test program with a number of their own cars in the hands of average drivers and in average service, to supplement the above part of the program by securing average results with a large number of cars under average service conditions. The companies making these tests include Studebaker, Packard, Dodge, Chevrolet, Stromberg and International Harvester.

## 4. Road tests by United States Government.

A very extensive series of road tests is also being run

by the Bureau of Standards, making use of fleets of Government-owned vehicles in Philadelphia and Pittsburgh. This program will require the use of about 80,000 gallons of fuel in several hundred vehicles. The three cities were selected because of their diverse road conditions, Pittsburgh being very hilly and Philadelphia almost level.

When these tests are completed, the research department of the Society of Automotive Engineers should be in a position to supply information which will make possible better economic use of the petroleum resources and longer postponement of the time when costs of fuel will retard the development of automotive transportation.

## Gasoline Powered Industrial Lift Truck

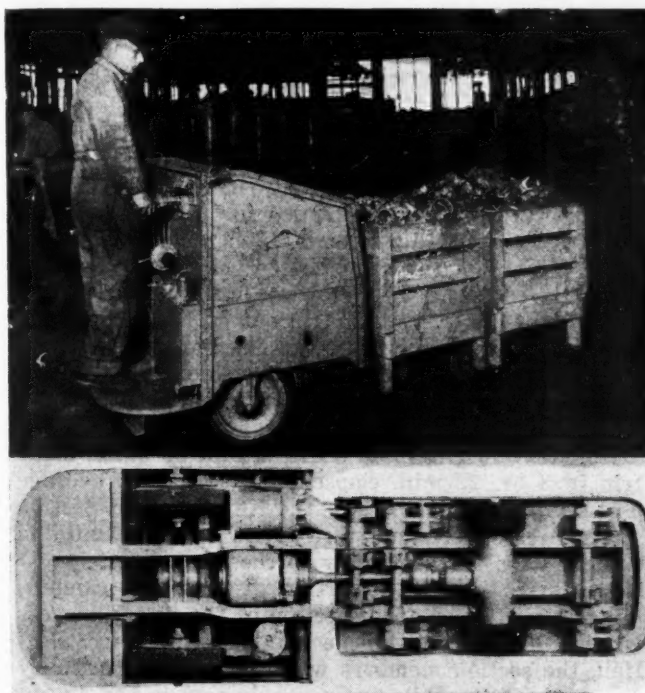
**A** GASOLINE powered elevating platform truck to be known as the Clark Truklift has been put in production by the Clark Trutractor Co. It conforms in appearance and uses to the electric elevating lift trucks which have been used in industrial plants for several years. Low initial cost, ease of maintenance, flexibility and continuous service are characteristics claimed for it by the builders.

The loading platform measures 26 x 54 in. and will elevate its load of 4000 lb. from a minimum of 11 to a maximum of 16 in. above the floor in eight seconds. There are automatic stops for both the up and down limits, and elevation can be stopped by the hand control lever at any point. The lifting mechanism is operated by hydraulic pressure. Power for locomotion and elevating the load is derived from a 15-hp., 4-cylinder,  $3\frac{1}{8}$  x  $4\frac{1}{2}$  in. tractor engine which is mounted at the rear in a closed compartment containing the transmission, the governor, the vacuum tank and the radiator.

A three-point suspension is used, the steering wheel forks being supported in a steel casting which is pivoted at the center of the frame on a chrome nickel steel pin 2 in. in diameter. The drive is through a Clark bevel gear axle fitted with ball and roller bearings. Driving wheels are cast steel with pressed-on  $10\frac{1}{2}$  x 5 in. rubber tires, whereas the steering wheels are of the cast-steel disk type with pressed-on 16 x  $3\frac{1}{2}$ -in. rubber tires.

The driving and elevating controls are mounted on the rear of the engine compartment and are operated by the driver who drives standing. The brake pedal is under the driver's foot and so arranged that the Truklift stops automatically if for any reason the operator steps off while the machine is running.

The total weight of the Truklift ready for work is 2500 lb.; its over-all length is 107 in., the width  $35\frac{1}{2}$  in. and the height 51 in. The machine has two speeds in each direction and is claimed to be able to climb a 10 per cent grade with a 4000 lb. load.



Clark Truklift in operation and view from underneath

**R**ECENT experiments with gasoline-driven cars and comparative costs of operation of this form of equipment and steam trains hold out the hope that passenger service now conducted at a loss on about 50,000 miles of American railroads may be turned to a profit. Including 25,000 miles of short lines and 25,000 miles of branch lines of Class 1 roads, to both of which this sort of equipment is especially adapted, about 19 per cent of the country's mileage lends itself to the change.

The first thing the motor car does is to reduce the number of the crew by half. As the wages of engineers and motormen are influenced in part by "weight on drivers," the actual pay is reduced by more than half, the motormen falling under the minimum classification.

Pittsburgh & Shawmut has two motor cars in operation—one out of Brookville on a 98-mile run and one out of Kittanning on an 83-mile run. The wages of the crew on

these runs are respectively  $17\frac{1}{2}$  cents and  $22\frac{1}{2}$  cents a train-mile. The cars average 6.8 miles a gallon of gasoline.

According to Dwight C. Morgan, vice president, in a statement to "Railway Age," total cost of operation, including wages, materials and supplies, fuel and 4 per cent depreciation, amounts to 35 cents a mile. The cost of operation of light steam equipment, based on the same method of ascertaining costs, is 71 cents a mile, or more than double.

**T**HE Engineering Advertisers' Association of Chicago is now publishing a monthly bulletin in the interest of its members. The Bulletin gives a digest of the speeches made at the various meetings and also includes other information and facts regarding the movement of goods from industry to industry, personal notes, etc.

# Two S. A. E. Sections Join in Discussion of Chassis Losses

Metropolitan and New England Section members attend joint meeting at Mason Laboratory, Yale University, to inspect chassis testing equipment and participate in discussion of paper by Prof. Lockwood outlining an investigation of the frictional losses in tires and other parts of the chassis.

NEW HAVEN, April 22.

**M**EMBERS of the Metropolitan and New England Sections of the Society of Automotive Engineers held a joint meeting here to-day for the purpose of hearing and discussing a paper on frictional losses in automobile chassis, by Prof. E. H. Lockwood of Sheffield Scientific School, Yale University, and of inspecting the chassis testing equipment in the Mason Laboratory. The meeting was one of the most interesting and instructive ever held by either of the two sections, and was well attended.

Most of the members of the Metropolitan Section journeyed from New York to New Haven in two rail cars built for the N. Y., N. H. & H. Railroad by Mack Trucks, Inc., which were especially provided for the purpose, but others who could not be accommodated on the rail cars made the trip in buses furnished by Mack Trucks, Inc. This is believed to be the first time rail cars driven by gasoline engines have made a trip out of New York, and is certainly the first opportunity afforded any large group of engineers to make a long trip in vehicles of this description. The distance, 74 miles, was covered in 2 hr. 45 min., including stops, or at an average speed of 27 m.p.h. The buses, traveling by road a distance of 84 miles, made the trip in 3 hr. 22 min. elapsed time, or at an average speed of 25 m.p.h. Members of the New England Section met the rail cars here and were given an opportunity to make short trips in them prior to the meeting.

After a trip through a portion of the Yale campus, including in particular an inspection of the new Harkness Memorial buildings, and luncheon in the University Dining Hall, the section members were given an opportunity to examine the automobile testing equipment in the Mason Laboratory, after which a test run was made on a car to illustrate the methods followed in routine work of this character. Professor Lockwood explained in some detail the working of the apparatus and the methods followed in its use.

The engineers then assembled in the laboratory lecture hall, in which the joint meeting was held. Chairman Slauson of the Metropolitan Section presided. A brief business session followed, at which a report on the canvass of the mail ballot for Metropolitan Section officers was read. The following officers were elected: Chairman, W. E. Kemp; vice-chairman, H. W. Slauson; treasurer, W. P. Kennedy; secretary, R. E. Plimpton; members of governing board, C. B. Veal, Arthur Waterman and Joseph Bijur.

Dean Breckenridge of the Sheffield Scientific School made a brief address of welcome to the visiting engineers, and complimented Professor Lockwood upon the thoroughness and interest taken in the experimental work done under his direction.

W. L. Bean, mechanical assistant to the president of

the New Haven Railroad, asked to make a few remarks regarding the rail car, stated that he believes it has a future in helping to make branch lines which are not now profitable show a profit, or at least operate with less loss than heretofore. He believes that only a start has been made in this direction and that considerable development work will be required before a wholly satisfactory rail car is developed, but has great hopes for success in this direction. With a sufficient equipment of satisfactory rail cars he believes that the New Haven road can show a saving of about \$500,000 annually on branch lines now operated at a loss.

Professor Lockwood then presented his paper, portions of which will probably be printed later in these columns. He first described briefly the apparatus used, this apparatus being the same as that fully described in *AUTOMOTIVE INDUSTRIES* last week. The methods used are similar to those employed in power tests of cars on the rear wheel dynamometer, many of the results reported having been obtained in routine tests of cars, several of which tests were reported in the article in these columns last week. Professor Lockwood stated that it had been found possible to separate bearing and some other friction losses from tire losses by allowing the tires to rest very lightly on the driving drums and by driving them through the drums in this manner to measure approximately the bearing loss only, since, when the tire is not deformed by passing between rim and drum, the loss in the tire is practically nil.

By driving the front wheels and the rear wheels, including axle parts, propeller shaft and main shaft of gearset, with gears in neutral and measuring the tractive force required, it has been found that, for fifty passenger cars tested from 1916 to 1921, the weight varying from 2000 to 5000 lb., the rolling resistance,  $R$ , is given by the following equation:

$$R = 30 + 0.012 L$$

where  $L$  is the weight of the vehicle in pounds.

In the case of seven 1922 passenger cars in good condition, equipped with cord tires, it has been found that

$$R = 0.019 L$$

while for four heavy trucks, three of which are of  $7\frac{1}{2}$ -ton capacity, equipped with solid rubber tires,

$$R = (30 \text{ to } 70) + 0.018 L$$

Professor Lockwood believes that the well designed and constructed car of the future will have a rolling friction of about 0.016  $L$ .

The rolling friction of the four tires (only) of various vehicles has been found to be about as follows:

Cord tires, 0.012  $L$  — 2.

Fabric tires, 0.018  $L$  — 3.

Solid rubber tires, 0.016  $L$ .

It will be noted from these figures that fabric tires offer about 50 per cent more rolling resistance than the cord



type, while solid rubber tires offer about the same rolling resistance as well inflated fabric tires.

The frictional resistance of the bearings in the front and rear axles, gears and other parts driven when the rear wheels are turned with the gears in neutral (all running idle) has been found to be about 0.06 L. The average frictional loss in the following cars—Overland, Mercer, Buick, Franklin, Haynes, Oldsmobile and Cadillac—was found to be divided about as follows:

	Per Cent
Total tire friction.....	66
Bearings, axle parts driven from it (running light) .	34

Speed has been found to have but little effect upon the rolling resistance of either tires or bearings, but of course the power loss increases in substantially direct proportion to the speed. Thick wall inner tubes add slightly, 5 to 10 per cent, to the total rolling friction of tires, and a rough tread adds about the same amount of frictional resistance, over the smooth tread, as does the thick wall tube, this applying, of course, to tires which are similar in all respects except as to the character of tread.

Partly worn pneumatic tires have been found to have about the same rolling resistance as when new, but partly worn solid tires have less resistance than new ones.

All sizes of pneumatic tires, Professor Lockwood said, have, in proportion to their carrying capacity, substantially the same rolling resistance, providing each size is inflated to the pressure recommended by the maker. Rolling resistance decreases with increase in inflation pressure, but the difference is more marked at the lower pressures. At high inflation pressures a given increase in pressure decreases the rolling friction more in the fabric than in the cord type of tire.

It was pointed out that the rolling resistance of a vehicle is often materially affected by changes in the temperature and consequently the viscosity of the lubricant.

#### Discussion

In the discussion which followed presentation of the paper, Major Ireland of the Motor Transport Division, Quartermaster Corps, U. S. A., stated that Professor Lockwood has been co-operating in the work which he, Major Ireland, has been doing on behalf of the National Research Council in studying the various factors relating to the rolling resistance of vehicles under various conditions. The results of this work, which includes in particular an effort to determine the effect of the character of road surface upon rolling resistance, are to be published as rapidly as possible.

Herbert Chase stated that he had been given an oppor-

tunity recently to study the methods followed and results obtained in vehicle tests made by Professor Lockwood and to criticise these in the light of past experience along similar lines. He commended the work already done, which he said should prove of great value to the industry as well as to individual engineers, but suggested that better methods of determining wind resistance be developed and that steps might well be taken to determine whether or not there is, as seems likely, a greater loss in tires and other power transmitting parts when these are driven under load instead of when running light, as in tests conducted by Professor Lockwood to date. Chase suggested that windage might be measured by driving the car on a level road at various speeds, noting the manifold depression and air speed (to determine the effect of head or tail winds) and that the car then be brought to the laboratory and the test repeated at the same speeds and manifold depressions, the power delivered at the rear wheels and that absorbed by the front wheels being measured. The difference between the last two quantities would then be a measure of the power lost in overcoming wind resistance. Suggestions for measuring the power lost in gears and tires under driving loads were also made, and the importance of developing engines which are efficient under the light loads of normal average running was pointed out.

In answer to a question by C. F. Scott regarding the effect of drum curvature upon tire losses, Professor Lockwood said that he had no data upon which to base a reply. He said in regard to a similar question regarding the effect of tire diameter on tire losses that he would expect the difference in power consumed for a given cross section and weight to be very small, if any existed.

Answering a question as to the reason for abandoning a device for direct measurement of drawbar pull which was formerly used, Professor Lockwood said that the resistance of the front tires to the forward motion of the car introduced a factor which seriously affected the results obtained, consequently the weighing through prony brake torque measurements had been substituted.

C. T. Myers suggested the use of an accelerometer for measurements of windage. This instrument can be used for the purpose when the amount of other resistance factors determined in the laboratory are known.

Others who entered into the discussion drew attention to the losses in springs, and the increased losses in tires which result from an irregular road surface. While the existence of such additional losses are recognized, Professor Lockwood said, he has not given consideration to their measurement.

## Aluminum Investigations of U. S. Bureau of Mines

A STUDY is now being conducted by the Bureau of Mines of the causes of, and methods for the prevention of, cracks in light aluminum-alloy castings. The investigation as planned includes also the determination of the contraction in volume and of the linear contraction of a series of commercial aluminum alloys, as well as an examination of the cracking tendency of the alloys when poured into different kinds of molds. This study is being made in co-operation with the General Motors Research Corporation and a number of automotive and other foundries. The investigation is part of a general study of defects in aluminum-alloy sand castings. Data have been gathered from a number of foundries as to the causes for cracks and the best methods of prevention. A number of measurements have been made in the laboratory on the contraction in volume and piping effect of

aluminum alloys and also on their linear contraction in graphite molds. The problem is in course of investigation.

ROBERT J. ANDERSON, metallurgist of the Bureau of Mines, Pittsburgh, Pa., is examining methods suggested for the deoxidation of aluminum and its light alloys. The presence of aluminum oxide in the metal or in its alloys seems to lead to defects of various kinds, and the problem is under consideration for study with a view to obtaining, if possible, a commercial deoxidizer. Preliminary experiments have been made with the use of misch metal (ferrocenium), and with boron suboxide for the deoxidation of aluminum-copper alloys. The former material appears to possess some possibilities, and further experiments are to be made.

# Dealer Mortality in Automotive Field Not Exceptionally Large

Considering the rapidity of development in the automotive industry, dealer mortality is not high as compared with that of older industries. Greater stability is necessary, however, to reduce selling costs. Departmentalized establishments growing more rapidly than specialized shops.

By Harry Tipper

THE term "automotive dealer" is not thoroughly expressive of the automotive retail establishment and the work which must be done in this field, because the term is too strictly limited to an understanding of selling. In an earlier article we pointed out that the automotive business had revolutionized the work of manufacturing development in several ways because it is the first time in the history of the industry that a complicated machine has been sold in enormous numbers and used by amateurs. The whole retail field in the automotive industry is concerned with the sale and maintenance of a unit system of transportation under the control of the individual and available for his purposes with great flexibility and convenience. Consequently, the sale of the merchandise, whether it be car or truck, parts accessories or supplies, is not the end of the transaction, but the beginning of the contact.

The value of the particular article is subject to the use of the transportation system and the big job of the industry is to make the transportation system more efficient and to keep it in shape.

In the ordinary lines of retailing the service which has been added is a very subsidiary part of the proposition and the main function of the retailer is to provide a reasonable selection of commodities in a convenient store; see that the customers know about the commodities in this store; and sell and deliver the articles to them. In 90 per cent of the cases this closes the transaction and any further service is of minor importance. In the automotive field, on the other hand, value of the retailer in the sale of the goods is measured by his usefulness in keeping the car or truck running or in adding to the efficiency, convenience, or comfort of using the transportation itself. From the complete car and truck to the small accessory, every article sold in this business is measured by its value in the work of transporting passengers or freight in the most convenient, comfortable and flexible fashion.

This business in its growth was faced with opportunity so large and diversified that the big problem was to speed up the production and distribution so that the waiting public could be satisfied at the earliest date in their demands for this species of transportation. The business grew with great rapidity, revolutionizing methods and seizing upon possibilities to accelerate the speed of its own growth so that the customer could be provided with this convenience of transportation as fast as possible. With this rapidity of growth, a great many differences occurred in this field in a larger measure than they occurred in the older fields where there has been an opportunity to settle down considerably further

and where the systems have been more firmly solidified.

The number of retail establishments has grown with great speed and as a consequence of this growth the number of people coming into the business of retailing in the automotive field has been very large and the mortality has been considerable. For many reasons the automotive retail field was an attractive one to the man who desired to be working independently. It was not governed by tradition. It was not slowed up by being solidified into the system. It was experimental, dynamic and offered large opportunities for the restless man who found the ordinary course of business too slow or too monotonous for him.

The men who entered this retail field came from all lines of business with all sorts of training. They entered a business with new problems, and no set methods of doing anything, so that they were obliged to experiment and find out the best way of dealing with their own difficulties. If any business man had been told that the retail distribution could be established within 15 or 20 years and grow from a small experimental possibility to the third largest industry, the thing would have been counted impossible. What has been done in this field is remarkable. It should not be remarkable that there are many differences in the retail establishments, many different tendencies running parallel to each other among which a manufacturer may be misled unless the strength of these various tendencies and their directional movement is thoroughly understood.

There is a general impression that people who go into their own business represent largely the more efficient individuals. This is not altogether so. There are many men who are restless and dissatisfied with the ordinary conditions of their employment, who will find an opportunity to escape from these conditions by entering a retail field where the capable requirements are not large and there is apparent necessity for more workers. In the years from 1910 to 1920, the automotive field offered a great visible opportunity to many of these men. Mechanics, salesmen, restless men from other lines of business, men from other retail lines—all flocked into the business of retailing, either the sales or the service required to perfect this unit system of transportation.

These conditions have brought the retailing of automotive apparatus and service to the point where the problem begins to show itself and the retail establishments must define themselves into a more orderly system in order to meet the future requirements. In other words, the work done by the retail establishments in the automotive field in the rapid growth up to 1921 has not been at the maximum requirements or concerned with



the maximum problems of the field. During such a rapid growth, many elements became involved in the field and many tendencies visible that are simply elements of growth and may pass out when the field defines itself more clearly.

The depreciation in 1921, coming as it did, after a period of unparalleled growth, has caused the manufacturer, the jobber, and the retailer to question and to analyze. This questioning analysis is resulting in the experimental development of many new alignments or realignments in the endeavor to secure a more efficient distribution or a more concentrated service value. These new alignments are not always developed along sound economic lines and some of them may only add to the confusion in the field instead of defining and simplifying. The present conditions to be observed are these:

1. The number of retail establishments in the automotive field is very small in proportion to other lines of business for the amount of money and effort involved, and it is probable that the number of retail establishments should be considerably larger in order to do all the work required for the maximum service of this unit system of transportation.

2. There are two apparently divergent tendencies to be observed in retailing:

- (a) The tendency to operate specialized shops

- (b) The tendency to operate departmentalized establishments

These tendencies need to be carefully weighed and considered in order that their significance may be understood. There are stores devoted entirely to supplies, accessories, etc.—sales establishments entirely. There are retail establishments devoted entirely to radiator repairs, machine repairs, electrical service, etc. There are also many retail establishments carrying an accessory department, a repair department, space for storage, and the other necessary elements for the work of keeping the automobile and the truck running.

A general examination of the situation shows that the departmentalized establishments are growing more rapidly than the specialized establishments, and they represent a very much greater proportion of the worth-while retail developments. This is a logical tendency because the bulk of the automotive transportation equipment is owned in the smaller towns and cities—where the departmentalized establishment possesses only sound and large possibilities of growth in development. The logi-

cal sound development of the business in all except a few large cities of the United States is along the lines of well organized, departmentalized retail establishments capable of providing the car owner with his new cars, his service, his supplies, his repairs and maintaining complete contact with the individual customer.

One of the elements of greatest importance in the retail field has been the mortality among retail establishments and therefore the greatest difficulty in the manufacturer's maintenance of the proper distributing outlets, both in character and in number. There is a good deal of misconception concerning this mortality. Many of the manufacturers in the automotive field appear to be under the impression that the mortality in this field is entirely out of line with the other retailing fields.

The mortality in the automotive field is higher than it is in the older retailing fields. It should be considerably higher on account of the rapidity of its growth and the very few years of its existence. It is not very much higher, however, and the indications are that in proportion to its age, it possesses as much stability as the older fields of retailing. In the investigations conducted just before the war the average percentage of grocery and hardware stores operating on insufficient capital reached between 30 and 35 per cent, and in the large cities the mortality in

this type of store was very considerable. It is estimated that approximately 40 per cent of the retail establishments in the automotive field are insufficiently capitalized, have no credit, and are therefore of doubtful stability, while the actual mortality in the field is estimated at about 33 per cent.

While this mortality is not startling, it is a very important question to the manufacturer because it means that upward of 20,000 dealers went out of business in 1921 and as many, or more, came in. All manufacturers are interested in limiting the losses involved in this development and maintaining themselves in the retail field in accordance with the increasingly efficient and stable elements. The field of retail establishments should be analyzed, not only as to present conditions and stability, but also as to the probable future developments, so that the contact of distribution can be maintained without feeling the full effects of the mortality nor the various difficulties involved in the experimental tendencies to be observed in the automotive industry.

## Room for More Cars in Peru

THE Peruvian market for automobiles has, in the past, been largely confined to Lima, the capital, and one or two other fairly large cities. This has been largely due, it was brought out in a recent issue of Commerce Reports, to the fact that highways connecting most interior points are in poor condition. This condition bids fair to be overcome, however, as the government is planning to build a series of roads in the interior connecting the more important places. Such a move should go a considerable distance toward increasing the potential car market in that country.

The best season for the sale of cars in Peru seems to

be during June and July, just before the celebration of the national fiestas. Money is more plentiful from August to October, when the cotton crop is marketed. Several obstacles are to be overcome in selling cars, chief among which is the high cost of upkeep. Gasoline is expensive, and service stations, especially in outlying districts, are rare things. Nevertheless, American cars have obtained a firm foothold and there is little to fear from foreign competition. The pioneer period of the automobile has passed, but as the interior sections are developed so will the sale of automobiles and equipment develop.

# AUTOMOTIVE INDUSTRIES

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## Automotive Engineers and Highway Development

**P**ROPERLY constructed and properly laid out roads are essential to automotive progress. In the past the roads have been built almost entirely without the advice or assistance of the automotive engineers who are responsible for the vehicles which must run over the highways. The civil engineers who have borne the entire burden of road development have not always had in mind sufficiently the needs of the automotive vehicle for which the roads were being built.

The automotive engineer has a definite and constructive part to play in road development. His assistance is needed in solving such problems as the following:

1. Relation of the vehicle to the road. The factors in vehicle design, such as weight distribution, springing, tire equipment, can be properly treated only through the efforts and co-operation of the automotive engineer.

2. The cost of vehicle operation, including fuel, service, upkeep, etc., is important in its relation to the cost of highway construction and maintenance.
3. Highway safety and education. Insofar as safety to the public depends upon vehicle design, condition and efficiency of brakes, ease of control, etc., the subject is one to be considered by the automotive engineer responsible for design.

A number of research problems are involved in these subjects, which demand the attention and consideration of the automotive engineer. It is time for the designer of the vehicle to play a more important part in determining methods and policies in developing the roads over which his vehicles are to travel.

## The Industry Watches Its Step

**S**TOCK chasers are on the road again for motor vehicle manufacturers trying to speed up deliveries of supplies. Large quantities of the smaller units and accessories used in passenger cars are being shipped by express.

Thus, in some respects, the industry has reverted to the conditions which prevailed at the peak of production in 1919 and early 1920. Production in the passenger car plants which build the more popular lines is rapidly approaching capacity when it has not already reached that point. As a consequence desperate efforts are being made to speed the delivery of supplies.

There are important differences, however, between the conditions now and those when the industry was at the zenith of its output. They are:

Manufacturers are not bidding against each other to get much needed material.

Manufacturers have learned their lesson and they are determined not to tie up their working capital in inventories which will be unwieldy if there is a slump in sales.

When all supplies are purchased on a hand-to-mouth basis there is little danger of inventories getting out of balance.

The larger builders are piling up no reserves of completed vehicles.

Parts makers are steaming ahead. Many of the companies which supply the larger passenger car builders, have reached capacity production and a few are working night shifts. Almost every manufacturer in that field has about all the business he can handle. They are in the same position as the vehicle makers, however, for they don't propose to build up big inventories when the commitments given them do not run more than sixty days ahead at most.

The improvement in business in the past two months has been astounding. Production is approaching its peak load, but the industry as a whole is moving cautiously and it is prepared to shorten sail at the first sign of a squall.

Even the most optimistic do not expect production can go on indefinitely at the present rate. They can see no slump ahead for at least sixty days, but they believe there is little doubt there will be a seasonal falling off in sales with the coming of July.



It probably would have been better for the industry if prosperity had not returned so rapidly and so suddenly. It is running too far ahead of the industrial fabric as a whole, although the country as a whole has made amazing progress since the close of January. It will, perhaps, be just as well if there is a slowing up in the third quarter to give a breathing spell and let the rest of the country catch up.

No matter what happens, it is certain that 1922 will be a better year than 1921, which wasn't so bad. If there is a slump in the third quarter, whatever is lost undoubtedly will be recovered in the last three months of the year.

With the Minnesota branch of a truck company selling more light delivery vehicles in the first fourteen weeks of the year than any other branch in the country, there is no doubt of what the farm market for motor vehicles will be by the close of the year.

## Financing Foreign Shipments

**A**UTOMOTIVE export trade has definitely turned the corner and is well on the upgrade. This fact is shown by every recent study of statistics and conditions. There are many problems before the American automotive exporter, however, which must be properly solved if our export trade is to be built upon the firm foundation that is desirable.

American firms in the past have borne very little of the burden of financing in their foreign business. Usually cash in New York has been demanded and obtained before the shipment was sent. Other nations exporting automotive products have usually extended more liberal terms to the foreign buyer.

This phase of exporting is particularly important at the present time. A representative of an important automobile exporter, after interviewing bankers and export houses in New York recently, voiced the opinion that it would be necessary for American automobile firms to take some risk in financing foreign shipments if they are to cash in on the big foreign market which undoubtedly is available. The advisability of such a step gets back eventually to the accuracy of the knowledge possessed by the domestic firm concerning its representatives in foreign countries and concerning the foreign markets.

A recent report from Spain sent out by the Automotive Division of the Bureau of Foreign and Domestic Commerce after stating that "American automobiles will probably continue to enjoy preference in the Spanish market" points out advantages enjoyed by our competitors for automotive business and adds:

"The method of doing business of these competitors should be another factor of concern. They are sending the cars on a consignment basis, and in view of the fact that Spanish dealers cannot be sewed up in ironclad contracts with American houses at the present time, these competitors are at a big advantage."

The matter of financing foreign shipments is one for individual treatment, of course, but there is every general indication that the American automotive exporter in the future will have to operate more as a real merchant—as in his domestic business—and less as a mere supply house for cash purchases.

## Better Starting Facilities Needed

**W**E are more than ever convinced that every car produced to-day should be fitted with some device beside a choke to facilitate starting. Even in temperatures such as those which prevail in most of the northern States during nine or more months of the year many if not most makes of cars require an undue amount of cranking before a start is effected. As a result several difficulties arise which might be avoided and these are of a kind which often cause the owner a maximum of dissatisfaction, not to say disgust. Every manufacturer who aims to give the ultimate consumer of his product the greatest satisfaction from its use, and only such can hope to succeed in the long run, should give this matter careful consideration.

Failure to make a quick start usually results in prolonged periods of cranking which discharge the battery and thus react unfavorably, to a greater or less extent, upon the ignition system, adding a further uncertain element to the starting conditions. When the choke is closed, as it frequently is during most of the starting period, large quantities of fuel are discharged into the cylinder, much of it ultimately reaching the crankcase, where it dilutes the oil and helps destroy its lubricating value. It is probable also that the flooding which comes from excessive use of the choke results in the formation of a mixture which is so rich that it cannot be ignited even by the best spark that can be produced. Until this over-rich mixture is expelled from the cylinders no start is possible. This leads to the suggestion that the choke operating mechanism be fitted with a spring so that it will return to its open position when released by the operator. A small dashpot might be added in some instances if the introduction of a time element proves desirable. In any case some means should be used to make the occurrence of flooding less likely.

Priming devices with and without electric heaters have been successfully employed in some instances and a few cars are provided with some special form of vaporizer or ignition device which is operative only during the starting period. Many cars start easily under most conditions without any special auxiliary apparatus, while others, sometimes of the same make, are always hard to start. It is not always apparent why this difference exists. No doubt different reasons apply in different cases. A study of these reasons should be made a part of any investigation of the subject and every instruction book should contain explicit instructions to guide the driver in making a quick start.

A discussion of the subject in the Forum by engineers who have had experience in this line will be welcomed and should prove profitable to all concerned. We know of no one improvement which seems likely to yield larger returns in helping to bring about freedom from trouble of a very annoying nature. Fuels marketed in this country have a lower percentage of volatile fractions during the summer months. Consequently the problem is one of immediate importance even though it is usually more serious in cold weather. It is not too soon to start efforts to solve it now.

# Sales Boom Brings Parts Shortage

## Affects Specialized Car Field Seriously

Stock Chasers on Road — Shipments by Express—Orders by Wire

By D. M. McDONALD

DETROIT, April 25—Passenger car business in the Detroit district has progressed to a point where the already slender store of parts and materials has been reduced to the vanishing point in a great many instances and in some cases has been entirely wiped out. The big battle of the moment is not to get business, but to get material.

Passenger car makers again have stock chasers on the road in an attempt to speed up deliveries and many shipments of smaller parts and accessories are being ordered by express.

Car makers in the specialized unit field are particularly hard hit for the shortages are not confined to any one unit. In other cases the body makers have fallen behind, but the serious shortage is with the specialized unit maker.

This shortage is most serious because of its origin in the basic metal and the impossibility of getting around the time required for treatment of the metal before it can be made up into the parts. A sudden shortage of malleables has been discovered in more than one plant and malleable stores cannot be replenished over night.

### Need of Skilled Workers

In the body making field the serious shortage is skilled workers. Newspapers here are carrying advertisements for men specializing in the various processes of body making, but the ranks are very slow in filling. Some companies feel a shortage of space which will be overcome by the addition of new buildings, and in the meanwhile body contracts are being sub-let by manufacturers or placed elsewhere than in the crowded shops by the car maker.

The Timken Axle Co. is installing new equipment in several of its units to meet the onslaught of orders. Deliveries have fallen behind, it is admitted, but with the new equipment the company will get back to an even footing soon after May 1 and will be entirely caught up by May 15.

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## Business in Brief

NEW YORK, April 25—A "profound improvement" in business conditions is reported by the Department of Commerce after a compilation of the latest commercial and industrial statistics. Optimism is based upon the better fundamental conditions throughout the country.

Two outstanding features noted by the department are the marked increases in iron and steel activity and the big increase in construction.

Reports from all steel centers indicate that demand is constantly growing. Production ranges from 75 per cent to 80 per cent of capacity, and incoming orders are considerably in excess of production. The coal strike appears to have affected industry but little.

Freight car orders placed by the railroads of the country thus far this year aggregate 51,791, as compared with a total of only 28,358 for all of last year. It is expected 20,000 more will have been ordered by May 1.

Unemployment is rapidly decreasing and there is an actual shortage of skilled workers in many lines.

More life is apparent in primary markets for textiles and cotton goods.

Lumber and building supplies are leading the way, but the market for agricultural implements and vehicles is stronger than at any time since the slump in farm prices in 1920.

Crop reports are irregular, as they always are at this time of the year. They are based largely on weather conditions, and the late arrival of spring weather as well as floods in many sections. On the whole, however, they are favorable.

Stocks are somewhat irregular, but prices, in general, continue to advance. Bonds are active and firm, money easier and exchange steady.

Bank clearings for the week ending April 20 aggregated \$7,035,495,000, a gain of 5 per cent over the preceding week and 15.2 per cent over the same week last year.

Total car loadings for the week ending April 20 showed a material decline because of the coal strike, but the loadings of miscellaneous freight and merchandise showed a continued gain.

## Production in May Will Be Up to April

Passenger Car Factories Near Capacity—Truck Plants Reach 50 Per Cent

By JAMES DALTON

NEW YORK, April 25—With April production of motor vehicles running far ahead of March it now is certain that May will show an equally large output, although the percentage of gain over the same period in 1921 will not be as large as in the first quarter. Factory after factory is speeding up its output and preparing for still larger schedules next month.

Manufacturers of many of the more popular passenger cars are approaching capacity. Sales of some of them are limited only by output. Dealers in several lines are unable to promise deliveries in less than two or three weeks. The bulk of the business remains in the lower and middle price classes, although a few companies in the higher price field are approaching capacity operations.

A majority of the companies which produce trucks on a quantity basis are running at 50 per cent of capacity. It is confidently predicted that, if the general business revival continues until fall at the present rate, commercial vehicles will be absorbed as fast as they can be turned out. The demand for light trucks which began two months ago has increased rapidly, and sales of heavy-duty vehicles now are becoming brisk, chiefly for highway and building construction work.

### Tractor Business Better

Price reductions in the tractor field have stimulated business to a surprising degree. At least three companies are operating at capacity in the production of the lighter models. Their ready sale is evidence of improved conditions in the agricultural districts.

At the beginning of April only a comparatively small number of parts plants were operating at more than 50 per cent of capacity. Since then the number in this class has increased amazingly. Several are running full blast, and probably 70 per cent of capacity would be a fair average for

(Continued on page 940)



## Stockholders Ratify Willys-Overland Plan

### No Dissenting Vote in Authorizing Bond Issue to Fund Bank Debt

TOLEDO, April 24—Preferred stockholders of the Willys-Overland Co. at a special meeting here to-day ratified without a dissenting vote the proposal made by the directors for funding of the bank debt through the issuance of \$17,500,000 of 7 per cent first mortgage bonds, to mature Dec. 1, 1923. The bonds will be taken up by the banks which had extended the company's loans for several months and will have the effect of pledging the fixed assets where formerly only current assets were involved as security for the loans.

The plan was developed by the board of directors after a majority had been drawn from the ranks of Toledo business men. Plans for the liquidation of securities owned by the company and for conversion of real estate holdings into cash with which to pay off the bonds are going forward, according to plant officials.

The production of the plant here has passed the 400-a-day mark, and the total for the second quarter of the year will surpass 30,000 cars, which is more than double the production during the same period a year ago. More than 8000 men are now at work in the plant in this city, and more are being added as rapidly as materials can be secured to boost production schedules.

Secretary L. A. Miller announced that enough assents of preferred stockholders of the Willys-Overland Co. to the reorganization plan for the Moline Plow Co. are being received to insure adoption of the plan.

### Tire and Valve Companies in Canada to Consolidate

OTTAWA, ONT., April 24—Within a few days it is expected that the merger of the Lion Tire & Rubber Co. and the Mead Universal Valve Co., Ltd., will be agreed to by the two lots of shareholders and the company be incorporated under Dominion charter to be known as the Lion-Mead Tire & Rubber Co., Ltd.

A site for the factory has been located in Hull, P. Q., and all plans are ready for the start when the merger is assured. The plant will manufacture tires, tubes, valves and other accessories.

### Stockholders Soon to Get Plans of Pierce-Lafayette

NEW YORK, April 24—Details of the plan for the merger of the Pierce-Arrow Motor Car Co. and the Lafayette Motors Co. are being worked out as rapidly as possible and probably will be submitted to stockholders in a short time. The consolidated company, in addition to an exchange of stock, is expected to issue

## Caution Is Still Necessary in Returning Industry to Full Strength

By B. F. EVERITT,

President of the Rickenbacker Motor Car Co.

Detroit, April 24.

**T**HOUGH there is a tremendous buying field for automobiles to-day and the sick child is apparently again a thriving infant ready to resume its development where it left off two years ago, it is unwise for manufacturers to assume too much from appearances. There is still a great deal of nursing to be done before the infant is as well as it should be. There is no reason to think that the malady has as yet entirely disappeared.

The manufacturer must guard against the accumulation of the evils of sudden prosperity and keep his sails trimmed to meet every wind. Rickenbacker Motors and probably every motor car manufacturer is operating to-day with a large number of orders ahead. It is our intention to keep our orders definitely ahead of output. In this way we will know where our materials are at all times. When sales fall off our manufacturing plans will always be within control.

The experience of the past two years has shown the inadvisability of stocking up dealers with cars to help the factory in unloading merchandise commitments and inventories. Factories to-day must place their organizations on a definite footing and fix the remunerations on a basis commensurate with the actual value of the services rendered. Mistakes have been made in the past under the impetus of boom periods.

Then, too, there has been a tendency to stagnate the working efficiency of organizations by adding too many assistants. Lack of personal touch has been a serious drawback to the industry in the past, particularly in the few years preceding the 1920 crash. The automobile has passed from the field of experimental products. It is now a staple, necessary in every field of human endeavor. Cars will be made better and better as time passes and there will always be a sane and steady increase in demand. By gauging manufacturing strictly by market requirements, there will be no recurrence of the glutted periods through which we have just passed.

\$10,000,000 or \$12,000,000 worth of notes and bonds. The proceeds will be used to pay off bank loans of Pierce-Arrow which approximate \$8,000,000, as well as the bank loans of the Lafayette company, and provide working capital in addition.

The capitalization of Pierce-Arrow consists of \$10,000,000 in 8 per cent preferred stock and 250,000 shares of no par value common. It has no funded debt.

The Lafayette company has outstanding \$4,000,000 7 per cent preferred and 40,000 shares of no par value common. It also has no funded debt.

### Priority in Lincoln Claims Enters into Case

WASHINGTON, April 24—Attorney General Daugherty has instructed Assistant Attorney General Riter to go to Detroit immediately to take special charge of the government's case against the old Lincoln Motor Co. and to press the claim vigorously.

Exception to the receiver's allowance of the claims of the 900 creditors will be taken by the government, it was announced. Daugherty called attention to the fact that the receiver already had approved claims filed by other creditors amounting to more than \$4,000,000, while nothing had been allowed to the government.

"The government's claims, instead of sharing with the others pro-rata, should have taken priority," he said. Should the government's claim for priority be allowed, it will result in the other 900 creditors losing heavily, the Department admitted.

## High Freight Rates Check Western Sales

### Edsel Ford Says They Must Be Lowered to Complete Business Improvement

NEW YORK, April 20—In the opinion of Edsel B. Ford, president of the Ford Motor Co., who came here to attend a demonstration of Fordson tractors in Long Island City, transportation costs are checking orders from the western agricultural states for cars, trucks and tractors. He believes freight rates must come down before business difficulties can be ironed out completely.

The Fords do not believe the fuel problem will become serious, even should there be a shortage of gasoline. Their company now is selling considerable benzol which is mixed half and half with gasoline for motor cars. It also has conducted encouraging experiments with alcohol.

Ford's European business has shown a material increase in the last month and a half, and sales abroad now are running from 11 to 12 per cent of the total business. Ultimately the Ford company will probably build plants both in Germany and Russia, but it has no intention of doing so in the near future. Ford made a significant statement that the company hopes to develop its foreign business to such a point that it will prepare practically the maximum production of parts the year round at its works in Detroit.

## Last Scripps-Booth Car Leaves Factory

### Plant Inventory Disposed of— G. M. C. Provides for Servic- ing Discontinued Line

DETROIT, April 22—The task of disposing of the inventory of Scripps-Booth Corp. has been accomplished and the last cars of this make to be manufactured have been shipped from the factory here. Although it was generally known for some months that the Scripps-Booth models would be discontinued, demand for the cars continued until the entire stock was sold.

General Motors Corp. decided to discontinue because the market for that type of car was not broad enough to sustain quantity production. Adequate provision has been made by General Motors for the service requirements of all Scripps-Booth cars now in the hands of owners.

A complete stock of all parts of the cars will be handled by the Scripps-Booth Service Division of General Motors with stockrooms in the former Northway engine plant and headquarters in the General Motors Building. Some branch service stations will be located in important cities of the country when complete servicing plans are worked out.

### Dealers Handling Other Products

Many of the former Scripps-Booth dealers are now handling other General Motors products. In Detroit the Scripps-Booth branch has taken over the used car business of Oakland and is also handling Samson tractors and trucks. Places have been made in the General Motors organization for many of the former Scripps-Booth factory personnel. A. H. Sarver, president and general manager, is continuing for the present in charge of Scripps service work.

The Scripps-Booth plant is being rapidly equipped for the production of Buick closed body cars. Parts for all Buick closed cars will be shipped from the Flint plant and assembled in Detroit. This has been done to provide greater factory space for Buick and to do away with the necessity of shipping the bodies, built in Detroit, to Flint.

### G. M. C. Will Complete Truck Plant at Pontiac

PONTIAC, MICH., April 22—Decision has been reached by the General Motors Corp. to complete the building expansion program at its truck plant here. The expansion was decided upon and an appropriation made in 1920 which contemplated enlarging the capacity of the plant to 25,000 trucks annually. This was carried forward to the point that the new machine shop was finished and equipped, and the new assembly line arranged.

The test house had been partly completed before the cessation of building

and is now to be pushed forward. It will make possible a capacity of 100 trucks daily. The plant has been operating on a production of 35 machines daily recently, a number that will not be sufficient if the present run of orders continues for a few weeks longer.

Very good prospects for business on the new motor-bus model being turned out are reported by the sales department. The new bus is making an appeal because of the design, aimed to prevent sideways and to promote comfort and ease of driving.

### New Harley Financing May Prevent Receivership

SPRINGFIELD, MASS., April 24—That the affairs of the Harley Co. are in a way to be adjusted satisfactorily without the appointment of a receiver was stated to-night by an officer of the company. Arrangements are said to have been made with a New York bank to write a \$1,250,000 mortgage to take up the first mortgage for \$725,000 held by the Hendee Manufacturing Co., and cover a bond issue and provide some additional working capital.

The matter of a receivership, for which a petition was filed recently in the United States Court in Boston, has been postponed until May 1. It is believed that the refunding of the company's indebtedness will have been made in the meantime, and the occasion for a receivership removed. The company has just booked a substantial order for drop forgings for automobile parts to be delivered to a Cleveland manufacturer.

### Oakland Will Adopt Flat Rate Generally

PONTIAC, MICH., April 24—The Oakland Motor Car Co. has decided to put into effect as quickly as possible a new plan of universal "flat rate" charges for service. The majority of its branches, distributors and dealers already have established this plan. Specialization on a piece rate basis is expected to do away with complaints from motorists that they never have any idea what a specific repair will cost until after the job is completed.

Another feature of service work by the Oakland company is the training of mechanics in a special school at the factory. These mechanics go back to the branches and distributors, and in turn open schools for the training of service men for Oakland dealers.

### NO BIDS FOR ALLEN ASSETS

COLUMBUS, April 22—Although a number of possible bidders from Chicago, Detroit, Cleveland and Toledo were present when the assets of the Allen Motor Co. were offered for sale, no formal bids were made. After waiting for a time, James M. Butler, representing Receivers W. C. Willard and George A. Archer, announced that another effort to sell the property would be made June 6 at 10 a. m.

## No Halt in Business of Gillette Rubber

### Receivers Were Appointed to Pre- vent Embarrassing Moves by Hostile Creditors

EAU CLAIRE, WIS., April 24—To insure the continuation of the business without interruption and enjoin any creditors from taking steps which might interfere, the United States court has appointed C. W. Lockwood and Frank C. Herman as receivers of the Gillette Rubber Co., with authority to continue the business and requiring creditors to file their claims with the court before June 1. The receivership was made effective in the determination of litigation brought by an Illinois creditor. Counsel for the Gillette company made the following statement:

The condition of the Gillette Rubber Co. has been improving daily for the past several months. The company is solvent and its business is increasing. The receivership proceedings were friendly in character and are for the purpose of preventing hostile creditors from embarrassing the operation of the plant when the present creditors' agreement expires April 30. Plans for reorganization are developing but it will take considerable time to work them out, and to give this time the only way is to put the company's affairs in the hands of the court's receivers.

### Full Faith in Receivers

C. W. Lockwood and Frank C. Herman, president of the Gillette Rubber Co., were appointed receivers, and Messrs. Aaron & Aaron of Chicago, and Roy P. Wilcox of Eau Claire were appointed by the court as attorneys for the receivers. The receivers will continue the operations of the plant under broad powers and will really be in better shape to carry on the business efficiently than the company itself could have done under existing conditions.

The character and ability of the men put in charge by the court is a guaranty that the company interests, including those of stockholders and creditors alike will be prudently and honestly administered. I think there is no doubt that within a short time the reorganization plans will be carried out in a way as to preserve this splendid industry for Eau Claire and establish it on a firmer and better basis than ever before.

### Bill for Rural Post Roads Will Be Acted On Shortly

WASHINGTON, April 24—Prospects for early action on the Dunn bill, authorizing \$65,000,000 for construction of rural post roads in 1923 and \$75,000,000 the year following, were assured when the bill was placed on the Union Calendar of the House and will come up for action by Congress within the next week.

Recommendation that the bill be enacted was made by the Committee on Roads after hearings were held with the Secretary of Agriculture, the Director of the Bureau of Roads, the Chief of the Forest Service and others.



## Optimism Features Firestone Meeting

### Business Everywhere Is Showing Gains, Sales Representatives Report at Conference

AKRON, April 25—Seven hundred field men, sales representatives and branch managers of the Firestone Tire & Rubber Co., from as many cities in the United States and Canada and from the principal tire distributing centers of Cuba and Mexico, united at their annual conference here in sending broadcast a message of cheer and optimism with the declaration that business everywhere is showing substantial signs of complete recovery.

At the opening session of the three-day conference, General Sales Manager L. G. Fairbank announced that Firestone was near its peak production with a daily output at present of nearly 24,000 tires and 25,000 tubes, as compared to a peak in 1920 of 28,500 tires a day.

Firestone representatives from the Northwest reported that the lumber business is picking up rapidly. Western and Midwestern states are showing strong gains, while the improvement in farming localities brought about by the upward trend of farm produce prices is reflected in stimulated sales of automobiles, trucks and tires.

"The time for optimism is now," Fairbank said. "Our survey of the country, gleaned from the individual reports turned in to us by men at the conference, show that business is coming back rapidly and that prosperity is just ahead. We expect tire production to continue its steady gait and look for steadily increasing sales."

The field representatives, after a series of business and sales talks, were taken through a series of booths demonstrating window displays. The conference closed Wednesday night.

## Paris Automobile Show Will Be Held Oct. 4-15

PARIS, April 11 (by mail)—Wednesday, Oct. 4 has been fixed as the opening day of the Paris automobile show, to be held, as usual, in the Grand Palais. The show will close on the evening of Oct. 15. This decision which puts the Paris show at the head of the European series has only been taken after considerable hesitancy on the part of manufacturers and dealers.

The Paris show will be on the same general lines as the one held last year. It will include every branch of the automobile industry, with a special building for trucks and tractors if necessary. American firms can only get space in the show after the requirements of other nations have been met. This restriction is adopted as a protest by the French industry against America's policy of a 45 per cent import duty before the war.

Automobile manufacturers who do not

rent a stand in the Palais will not be allowed to exhibit cars on body makers stands. This will particularly affect Rolls-Royce and Ford. These two firms decline to exhibit at the Paris show, but large numbers of Rolls-Royce cars are always to be found on body builders' stands, and Fords with mechanical modifications or unusual types of bodies are always on view in big numbers.

A further refund has just been made on last year's Paris show rentals, making a total of 50 per cent refunded to exhibitors.

## Sees Dunlop Resumption at Buffalo Coming Soon

BUFFALO, April 22—Production is soon to be begun at the \$25,000,000 tire plant of the Dunlop company here, Albert L. Kinsey, president of the Buffalo Chamber of Commerce, told the members of the Equality club of the Central Y.M.C.A. to-day.

"There have been many rumors regarding disposition of this plant," Kinsey said. "Recently the Chamber of Commerce had communication with a large automobile firm which contemplates changing its location. The Dunlop interests were approached to determine if their plant is available for purchase."

"Those who approached the Dunlop company were informed that its American plant is not for sale at any price. The impression was given that commercial production of tires will be begun in the near future, probably in the early fall."

## Chassis Lubricating Corp. Locates Plant at Monroe

NEW YORK, April 24—The Chassis Lubricating Corp., which has been conducting experiments for three years on a chassis lubrication system, has located its factory at Monroe, Mich., and has an assembling plant at 1926 Broadway, New York.

The company is incorporated in Delaware for \$1,200,000, and the officers are Rex W. Wadman, president; Fred H. Gleason, chief-engineer, and Martin W. McCloskey, secretary and treasurer. The directors are Fred H. Gleason, Joseph Van Blerck, E. V. Rippingille, George V. Codrington and N. G. Rost. Van Blerck is the head of a factory producing marine, aerial and truck engines and Rippingille is president of the Watson Stabilizer Co. and until recently was sales manager of the Hudson Motor Car Co.

## AWARDED STAR GEAR CONTRACT

SYRACUSE, April 24—The New Process Gear Co. of this city has been awarded the contract for differential gearsets for the new Star. Gears for the car have been produced at the local plant for some time. The factory is now operating nights in some departments and approximately 700 persons are employed. The company is also making gears for the Willys-Overland.

## Durant May Obtain Plant at Elizabeth

### Likely to Be Only Bidder When Property of Willys Corp. Is Auctioned in June

NEW YORK, April 24—Durant Motors, Inc., probably will be the only bidder for the big new Elizabeth plant of the Willys Corp. when it is put up at auction by the receivers June 9. An auction sale has been decreed by the Federal court, and private sale of the property, therefore, is not permissible. No definite information is available as to the amount which will be bid, but it is understood it will be about \$500,000 less than the \$4,000,000 which the receivers have asked Durant to pay. The original cost of the plant was about \$10,000,000.

If Durant obtains the property, as it is expected he will, it is probable the Long Island City factory, which was equipped to turn out the Durant four, will be leased and the Elizabeth plant used to produce the Durant line, as well as the new Star. The primary purpose of the purchase, however, will be to provide space for assembling the Star in quantities.

The Elizabeth factory is said to be the largest automobile plant in the world under one roof. It covers 38½ acres, and it contains 1,200,000 sq. ft. of floor space. It was built to produce 250 six cylinder cars in an eight-hour day, or 500 if the factory was operated in two shifts. It would be possible to assemble in it at least 1000 Stars a day. It is probable that one end of the plant in which much machinery has been installed will be leased by Durant if he bids in the property.

### Could Start Star in Quantities

Purchase of the Willys factory would permit quantity production of the Star almost immediately, as well as increased output for the Durant four.

A. T. Sturt, chief engineer of the Durant Motor Car Co. of New York and engineers representing the Continental Motors Corp. have been devoting their time for the past three weeks to thorough road tests of the Star. These tests have been made over rough country roads in Virginia and other Southern States. They have been designed to demonstrate the endurance of the new car and are reported to have been entirely satisfactory. It is said the little car has averaged 30 miles per gallon of gasoline in the difficult tests to which it has been subjected.

## TRUCK FOR TOURISTS

SAGINAW, MICH., April 21—The Ruggles Motor Truck Co. has entered a truck for the 1922 tour "Around Lake Michigan." The truck will be of special design to carry baggage for tourists and will be mounted on a 2-ton chassis to travel at a passenger car speed. The body will have three decks for baggage, with a capacity of 110 suit cases.

## General Motors Makes Special Export Line

Producing New Buicks and Chevrolets in Canada to Meet Foreign Tastes

NEW YORK, April 22—A special line of Buick and Chevrolet phaetons is being put into production for the export trade at the Oshawa, Canada, factory under the control of General Motors Export Corp. In making the announcement, officials of the export company stated that the new automobiles, which mount much extra equipment, had been added to meet an overseas demand for cars with different colors and different equipment than the standard lines.

Coincident with the New York exposition, Buick announced a special maroon roadster on the six cylinder line. The new models from Oshawa carry out the same purpose. The six-cylinder phaeton models are finished in either blue with black wheels or maroon with natural wood or maroon colored wheels. The top is of special material, with glass side windows and natural wood bows. The equipment includes electric tonneau light, nicked foot scraper, rubber trimming on the running board, transmission lock, gasoline tank under cover, Alemite lubrication, front bumper and radiator thermometer. The seven passenger model is furnished with a power driven tire pump. The four cylinder Buick is finished in blue and is provided with much of the same equipment.

The new Chevrolet is finished in green, with gold stripe trimming and black fen-

ders. The top is of improved waterproof material, in either black or drab. The instrument board is illuminated and cord tires are standard. Fuel feed is by vacuum system, with tank at the rear of the body, differing from the standard model. The radiator is of nickel finish and the car carries a front bumper.

## S. A. E. Names Committee to Aid Road Development

NEW YORK, April 22—The Society of Automotive Engineers has appointed a highway committee to bring together the research and educational activities of the society along highway lines. Herbert Alden is chairman of the committee. The other members are: W. A. Brush, F. A. Whitten, George Green, W. E. Lay and H. C. Dickinson.

The society feels that the automotive engineer has not had enough to say in the direction of highway development, and that as a consequence the construction of highways has not been carried forward with enough consideration for the needs of the vehicle which is to use the roads. The mechanical side of the question, it feels, has naturally been neglected by the civil engineers who have done the highway work.

## ASKS BOSCH INQUIRY

WASHINGTON, April 24—Investigation by a special Senate committee of the administration of the Alien Property Custodian's office, especially the sale of the Bosch Magneto Co., has been asked in a resolution introduced by Senator King of Utah which has been referred to the judiciary committee.

## Government to Make Tire Survey Abroad

As Result of Conference Official Will Go to Europe to Determine Market

WASHINGTON, April 21—A survey of the European automobile tire market will be made by the Department of Commerce, it was announced to-day by the Rubber Division, following a conference of national tire builders and rubber dealers.

Dr. P. L. Palmerton, chief of the Division, will sail for Europe immediately and make an exhaustive study of that country as a market for American made automobile tires and other rubber goods products. This will be the first foreign survey ever made by the government, in an endeavor to find a foreign market for United States rubber and tire exporters.

The scope of the survey, it was announced, will comprise practically the whole of reconstructed Europe and will require, it is expected, ten months or a year to make.

Among those who attended the conference to-day and endorsed the survey of the department were: F. E. Titus, chairman, B. F. Goodrich Corp.; A. G. Lubke, vice-chairman, General Tire & Rubber Co.; A. R. Gormully, Ajax Rubber Co.; Harry Braender, Braender Rubber & Tire Co.; F. K. Espenhain, Goodyear Tire & Rubber Co.; D. D. Yard, Pennsylvania Rubber Co.; George S. George, Federal Rubber Co.; K. S. Chamberlain, of the Fisk Rubber Co.; C. E. Wagner, Miller Rubber Co., and E. H. Huxley, United States Rubber Export Co.

## Representatives of Industry Discuss Export Problems



The meeting of the Contact Committee formed from the automotive industry for cooperation with the automotive division of the Bureau of Foreign and Domestic Commerce marks the first occasion upon which representatives of all phases of the industry have come together for a joint discussion of foreign trade problems.

Reading from left to right the members of the committee are: (Seated) George F. Bauer of the National Automobile Chamber of Commerce; Dr. Julius Klein, director of the Bureau of Foreign and Domestic Commerce; T. F. Cullen, Automobile Trade Journal; G. W. Brogan and S. D. Black, representing the Automotive Equipment Association; M. L. Hemingway, general manager of the Motor and Accessory Manufacturers Association; Luther K. Bell of the Aeronautical Chamber of Commerce; George E. Quisenberry of the Class Journal Co.; M. P. Hoepli, assistant chief of the automotive division of the bureau; W. G. McCann of the Motorcycle and Allied Trades Association; Norman G. Shide of Automotive Industries and M. Lincoln Schuster and S. S. Meyers of the M. A. M. A.

Among those standing are Gordon Lee, chief of the automotive division who organized the committee, second from the left; J. Walter Drake, chairman of the foreign trade committee of the N. A. C. C.; W. O. Rutherford, chairman of the foreign trade committee of the M. A. M. A.; L. E. Warford of the N. A. C. C. and Ira Hands, secretary of the National Association of Engine and Boat Manufacturers.



## Edge Trade Body Bill Has Life Assured It

### New Jersey Senator Will Push Legislation Defining Activities of Associations

WASHINGTON, April 24—Legislation presented to the Senate by Senator Edge of New Jersey, designed to define the activities of trade associations, is not to be allowed to sleep in the files of the Judiciary Committee, according to the Senator. His resolution has developed a great deal of support among trade organizations, and letters are being received by members of the Senate and House approving it. Senator Edge said:

I have no intention of permitting the important subject of defining the power of trade associations to be dropped. After two days' debates on the resolution providing for a joint Congressional committee to investigate the subject it became generally apparent that the opposition, realizing that by agreement the appropriation bill, immediately followed by a tariff bill, would necessarily displace the resolution on the calendar, and they therefore would not permit the vote.

I am reasonably positive that if there had been sufficient time and a vote could have been secured the resolution would have been passed. However, it is not important, as the main object of the resolution is covered by the bill I have introduced, which is in the Judiciary Committee.

The only difference in the present situation will be that the Judiciary Committee will hold public hearings and consider the subject rather than a special committee. So far as I am concerned, I am entirely satisfied with this procedure and have been assured by the chairman of the Judiciary Committee, Senator Nelson, that he will select a committee who will give full attention to the important schedule.

### American Steam Truck Makes First Delivery

CHICAGO, April 22—The American Steam Truck Co. this week delivered the first steam truck produced in its factory here. The truck is of four ton capacity and sells for \$5,000. C. R. Howard, president of the company, said that the factory is now producing at the rate of about one a week and that he hopes to increase the capacity to 20 a month.

The company is also building steam passenger cars and expects to have the first five completed between May 1 and 15. The first cars are to be 5-passenger phaetons and priced at \$1,650. It is expected to have a full line of passenger models later, Howard said, as well as to build trucks of five-ton and seven-ton capacity.

The company has made sales contracts for several states. A company composed of L. F. Gard, B. S. Edwards and C. A. Webb of Gary has contracted for the territory of Indiana and Michigan; A. H. Alexander of Webster City, for Iowa; J. F. Howard of Milwaukee for Wisconsin; H. A. Moje for Chicago and William M. Einhorn for Cook County outside of Chicago.

### GENERAL MOTORS CORPORATION 224 WEST 51<sup>ST</sup> STREET NEW YORK, N. Y.

May 1, 1922

#### To the Stockholders:

The automobile is the largest unit of merchandise sold for cash to the individual consumer.

In the early history of the industry, as there was no parallel to follow, motor makers could not profit by the credit merchandising experience of other manufacturers. Today the merchandising of the automobile is upon the threshold of transition from a cash to a credit basis, similar to that through which has passed the merchandising of nearly every other product.

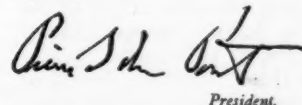
The selling and advertising force behind the marketing of automobiles has outstripped the progress of the credit machinery available to the industry. To supplement the credits which local bankers have extended to the automotive industry, a group of specialized financing companies entered the field and they have done pioneer work in credit merchandising.

The General Motors Acceptance Corporation was organized three years ago under the banking law of the State of New York as an associated independent banking institution to provide credit accommodations exclusively for General Motors distributors and dealers and purchasers of General Motors products. The functions of the General Motors Acceptance Corporation are to supplement existing local banking facilities, which accomplish two things: first—that General Motors distributors and dealers, with approved credit standing, are enabled to finance their purchases and sales upon a thoroughly sound banking basis; which in turn means, second—that General Motors Corporation is enabled to sell its products for cash. This necessitates the employment of much less working capital than would be needed were the Corporation itself to attempt to extend credits generally.

At this time of year the desire to buy automobiles is strongest and the demand by individuals for credit accommodations is greatest. Accommodations under the GMAC Plan are available only to those who measure up to proper credit standards. Our stockholders are all concerned in the financial success of General Motors. I am directing attention to the GMAC Plan of financing, which has been and will continue to be instrumental in augmenting sales, in order that the stockholders may fully appreciate this important part of our merchandising operations.

With a clear understanding of this, I am confident stockholders can and will cooperate in stimulating sales of our cars, trucks and other products.

Yours very truly,



President.

Facsimile of letter of Pierre S. du Pont

### Selling of Automobiles Is Reverting to Credit Basis, President du Pont of G. M. C. Tells Stockholders

NEW YORK, April 25—The importance of the General Motors Acceptance Corp. in the selling system of the corporation is emphasized in a booklet, summarizing its operations, which is being sent to all stockholders. The booklet is prefaced by a letter, shown above, addressed to stockholders by Pierre S. duPont, president of General Motors and chairman of the board of the E. I. duPont de Nemours & Co., one of the largest industrial organizations in the world.

In his letter, duPont gives expression to a conclusion which the automotive industry as a whole has been slow to grasp. This is that "the automobile is the largest unit of merchandise sold for cash to the individual consumer" and that "the merchandising of the automobile is upon the threshold of transition from a cash to a credit basis." He adds a word of credit to the specialized financing companies which have done financial work in automotive merchandising to

supplement credits from local banks.

The booklet gives some surprising figures regarding the General Motors Acceptance Corp., which, it says, now ranks 120th among the banking institutions of the United States from the viewpoint of capital, surplus and undivided profits. Since its inception early in 1919 to April 1, 1922, the corporation has financed under its retail plan 146,937 cars, trucks and tractors, and 102,074 under the wholesale plan. This does not include the operations of the foreign department or the financing of other General Motors products.

As of Dec. 31, 1921, the company shows total assets of \$31,933,965. The total amount of financial accommodation extended since its organization has been \$227,743,664, divided as follows: Foreign, \$27,897,700; retail, \$107,802,979; wholesale, \$92,042,985. This means that it has financed General Motors cars of a retail value in excess of \$300,000,000.

## Plants Speeding Up in All Branches of the Industry

### Western Malleables Reopens Foundry

BEAVER DAM, WIS., April 24—The increased call for malleables from the automotive industries, railroads and other extensive users has made it necessary for the Western Malleables Co. to reopen its Center Street foundry, one of four large shops operated in that city. The first shop to re-open, namely, the Elm Street plant, has been operating for nearly three months and business is beyond its capacity. The other two shops are being placed in readiness for an early resumption of operations as the volume of new business requires further extension of available capacity.

### Republic Truck Sales Increase

ALMA, MICH., April 24—F. E. Smith, president of the Republic Motor Truck Co., reports that both February and March sales showed an increase of 50 per cent over the preceding month and that April sales are running at a rate of 50 per cent improvement over March. The company has closed a contract with the United Railway & Electric Co. of Baltimore for twenty-six buses. This order was placed after a five months' test and a thorough investigation of bus operation in Europe and America.

### Buick Has Big Schedule

DETROIT, April 24—Production of the Buick Motor Co. for the second quarter will be 27,000 cars, or 40 per cent greater than the first three months, President H. H. Bassett says. It will be 8000 more than the second quarter of last year and within 2000 of the 1920 second quarter, which was nearly a record. There is no abatement of business coming from large cities and within the past week surprisingly large volume of business has come out of Iowa and Nebraska.

### Timken Back in Deliveries

DETROIT, April 25—The Timken Detroit Axle Co. is re-equipping a number of departments in several plant units which, when completed, will give it increased capacity. The company is behind in deliveries, but is distributing its output among its many customers so that no one will be without a proportionate share, by working extra shifts. The company declares it will be in a position to make immediate deliveries within thirty days.

### Ford Output 4000 Daily

DETROIT, April 25—The Ford Motor Co. made the statement to-day that the five-day week announced by President Edsel Ford some weeks ago will not become effective until late in the summer, by which time the Highland Park plant will be re-equipped. Rush of business in the past few weeks has caused the company to resume its former six-day week schedule, and it is now running about

### BIG SHIPMENT LEAVES G. M. CANADIAN PLANT

OSHAWA, ONT., April 24—A train of sixty flat cars carrying cases containing 304 Chevrolets, Buicks, Oldsmobiles and Oaklands, weighing 504 tons, shipped from the plant of the General Motors of Canada, Ltd., here, is said to have been the largest single export shipment ever started from a Canadian automobile factory.

The shipment will be transferred at the Atlantic seaboard to the steamer Canadian Conqueror for shipment to foreign ports, including Constantinople, Egypt and New Zealand.

It is said that General Motors has on hand enough export orders to keep the factory going full speed for several months.

4000 cars daily. No record production days have yet been reached, but the factory is slowly arriving at the point where new high marks for daily output may be expected.

### Maxwell at Capacity

DETROIT, April 25—All plants of the Maxwell Motor Corp. are now operating at capacity. April production will be in the neighborhood of 6500 cars and that of May 7000 cars, which are substantial increases over the first part of the year. In January the production was 2000, February 2200, and March 3600.

### 500 Rickenbackers in April

DETROIT, April 25—The Rickenbacker Motor Car Co. will build 500 cars in April and will run far ahead of this total in May. The company has contracts with its dealers assuring 8500 cars will be produced in the balance of the year, and they will endeavor to increase this total to 10,000 for its first year's work. The equipment of the factory is now about completed permitting full production.

### Truck Sales Gain 375 Per Cent

NEW YORK, April 24—The New York branch of the General Motors Truck Co. reports that thus far this year its business has been 375 per cent greater than in the same period last year.

### March at 65 Per Cent Capacity

NEW YORK, April 24—Mack Trucks, Inc., is operating at about 65 per cent of a capacity production of 800 trucks a month and it is expected that within the next thirty days maximum capacity will be reached.

### Kissel Boosts Schedules

HARTFORD, WIS., April 24—The Kissel Motor Car Co. has recently increased its working schedules so that its operations are now the equivalent of 75 per cent of capacity, three-fourths of its normal working force being employed on a ten-hour basis, or fifty-five hours a week, with a Saturday half-holiday. During the last fourteen to eighteen months the Kissel factory was operated between 35 and 60 per cent of capacity, according to fluctuations of demand. The present increase is justified not only by the improvement in the call for passenger cars and trucks, but for the Kissel special highway contractors' truck, which has special equipment.

### Hendee Foreign Trade Better

SPRINGFIELD, MASS., April 24—In the first three days of last week the Hendee Manufacturing Co. received calls for 250 machines, total orders on hand running 800 ahead of production. Improvement in foreign trade is especially noteworthy, business with Holland showing marked gains. Last fall the Holland branch had over 700 machines on hand unsold; it is fast disposing of its stocks and has ordered 300 motorcycles to be shipped not later than May 30. Inclusive of this, the company has on hand orders for between 1100 and 1200 machines.

### Hupp Has Biggest Single Day

DETROIT, April 25—Hupp Motor Car Corp. shipped 215 cars on April 17, the biggest single day's delivery the company ever made. Total April shipments up to that day were 2050. Total April production sought is 4000. March, with an output of 3005 cars, was the highest single month previously. President Charles D. Hastings said the impetus of buying extends to every part of the country with the exception of the exclusively cotton growing states in the Southeast.

### Night Shift for Chevrolet

DETROIT, April 25—The Chevrolet Motor Co. has started a night shift for the first time in several months, the April schedule calling for approximately 10,000 cars. About 900 axles are being turned out a day and the production of engines totals 800 daily. Shipments of the company for February were in excess of 10,000 cars.

### Atwater Kent Increases Force

PHILADELPHIA, April 24—The Atwater Kent Manufacturing Co., which is now operating at 90 per cent capacity, has increased its employees 150 per cent. It now employs a large night shift. The company expects the automobile trade this year to equal the record of twelve months' period in 1919 to 1920.



## Men of the Industry and What They Are Doing

### Cravens Heads Climax Engineering

George W. Cravens, formerly associated with the American Motors Corp. of Plainfield, N. J., has become president of the Climax Engineering Co. of Clinton, Iowa. This company, which will manufacture internal combustion engines for all types of power driven machinery, is the successor to the old Lamb Marine Engine Co. which has devoted its efforts for several years to the manufacture of tractor engines, but which now is branching out into the industrial field generally.

### Alvin Is U. S. Truck Sales Head

Forrest J. Alvin, general manager of the United States Motor Truck Co. of Cincinnati, has been appointed president and general manager of the United States Truck Sales Co. of St. Louis, to succeed J. F. Mackay. Mackay, who is vice-president of the National City Bank of St. Louis, has been elected chairman of the board of directors and of the finance committee of the St. Louis company.

### Young Joins Spring Company

James W. Young, who was assistant general manager of the Oakland Motor Car Co. under Fred W. Warner for some years, and who retired after Warner's resignation, has become associated with the Spencer Spring & Axle Co. of Wilkes-Barre.

### Crawford Resigns from Allen

J. M. Crawford, who has been chief engineer in charge of manufacturing for the Allen Motor Co., Columbus, has resigned, due to the postponement of the sale of the company from April 18 to June 6. Before taking up his work with the Allen company Crawford was connected with the Chalmers Motor Corp. as assistant engineer.

### Frank Wolfe in Private Business

Frank B. Wolfe, assistant comptroller of the General Motors Corp. in charge of the cost division, has resigned to enter private accounting work in Detroit.

### Moock Is Visiting Dealers

Harry G. Moock, assistant general sales manager of the Hudson Motor Car Co., in the course of a trip on which he is visiting dealers, spent a day with the New York organization and addressed the salesmen.

### Gleason Joins Durant

C. D. Gleason has been appointed sales manager for the Dominion of Canada by M. B. Leahy, general sales manager for the New York, Lansing and Toronto plants of Durant Motors, Inc. Gleason goes to the Durant organization from the Chevrolet Motor Co., with which

he has been identified for several years. He was for a long time Chevrolet distributor at Winnipeg and knows the Dominion trade thoroughly. Later he was in charge of Chevrolet sales in the Pittsburgh division and more recently was transferred to the Chevrolet staff in Detroit.

### de Vignier Leaves Fibre Company

R. M. de Vignier has resigned as chief engineer of the American Vulcanized Fibre Co., Wilmington, Del. de Vignier was connected for many years with the Western Electric Co. and the duPont company as development engineer and also produced the Mercury passenger car, work on which was stopped at the opening of the war. He is considering several proposals for the future, but has not yet announced any definite plans.

### Lassiter May Head Merger

C. K. Lassiter, vice-president in charge of manufacture of the American Locomotive Co., has resigned, it being reported that he will head the new merger of machine tool manufacturing companies.

### McDermott Now in Sales Work

Luke B. McDermott, factory manager of the Franklin Automobile Co. of Syracuse, has become connected with the sales department of the Martlew-Bamerick Co. McDermott has been associated with the automobile industry for many years.

### McLuny at Peerless Branch

A. K. McLuny has been appointed manager of the Pioneer Motor Co., the Peerless branch in San Francisco with a sub-branch in Oakland. For many years McLuny was closely associated with R. H. Collins, president of the Peerless Motor Car Co., in manufacturing and sales, after which he embarked in the automobile business on his own resources.

### Thurman With Equipment Makers

George Thurman, for some years connected with the Oakland Motor Car Co., has resigned to become secretary of the new United Automotive Equipment Co., which will have offices and a plant at Pontiac, Mich.

### Barnett Succeeds Shaw

D. C. Barnett, who succeeded Lynn M. Shaw as secretary of the Youngstown Automobile Dealers Association, has taken Shaw's place as manager of the Indiana Automotive Trade Association. Shaw has assumed his position as assistant general manager of the National Automobile Dealers Association and has started on a trip which will cover fourteen cities in Texas, the Gulf States and the Atlantic Coast States.

### Shugart an Officer of U. S. Rubber

At the recent organization meeting of the directors of the United States Rubber Co., George S. Shugart, vice-president and general sales manager of the United States Tire Co., was elected a second vice-president of the rubber company.

### New Racing Officials Named

D. V. Nicholson, assistant secretary of the California Automobile Association, has been named official representative of the contest board of the American Automobile Association. He will direct the general work of the board in northern California and will officiate at the Greater San Francisco speedway races. D. J. Lafferty, Santa Rosa director of the state association, has been appointed official representative for the Santa Rosa district, and a third official is to be named to act at the Fresno speedway. E. F. Cheffins, who has represented the board at the California speedways in the past, is retiring after ten years' service.

### West Has New Connection

Louis D. West, for several years connected with the Chilton Co. as Cleveland district manager, has resigned to become associated with the H. L. Rackliff Co., automotive marketing counselors of Cleveland and New York. He will have charge of the Rackliff organization's field work in Ohio, Indiana, Kentucky and western Pennsylvania.

### Swinehart with Hannibal Rubber

C. A. Swinehart, after eight years' service with the Victor Rubber Co. as sales manager, has severed his connections with that company and has taken charge of sales of the Hannibal Rubber Co., Hannibal, Mo. Swinehart for seven years was associated with the Swinehart Tire & Rubber Co., directing sales.

### Louis Staff in Own Business

Louis A. Staff, who recently retired from Staff Brothers Co., will continue for himself in the business of handling automotive equipment. He has opened offices in the Fisk Rubber Co. Building in New York.

### Colt Goes to Distributorship

William L. Colt, for nearly five years division manager of Willys-Overland, Inc., in the Eastern district with headquarters at New York, has resigned to become the president and active head of the Overland Providence Co., Willys-Overland distributors for Rhode Island, a concern he established and financed about a year ago. Prior to his association with the Willys organization, he was for eight years president of the Colt-Stratton Co., New York.

## Sales Boom Brings Shortage of Parts

**Affects Specialized Car Field —  
Expedients Adopted to Get  
Supplies**

(Continued from page 932)

Continental Motors Corp. declares it is fully equipped to meet all delivery requirements, but has been compelled to hold up shipments because of the non-delivery of other necessary parts to its customers. Shipments are being sent forward in the quantities that the makers of other units or bodies are capable of furnishing, so that inventories may be kept balanced.

Fisher Body Corp. has plans fully made to build an addition to its former airplane body plant, which has been practically idle since the war, which will give it an additional 1,000,000 feet of body manufacturing space in Detroit.

### Sudden Demand for Bodies

The extent of body demand may be gaged somewhat from the fact that one independent body company has gone into production on 17 new types of bodies within 10 days. Some time will be required, the company declares, before capacity production can be reached on the new work, owing to the suddenness of the demand and the impossibility of getting skilled men quickly.

Other body companies report themselves as able to keep up to delivery requirements through employment of double shifts and overtime.

Incidental to the body situation, it may be reported that closed car demand is running 20 per cent higher than had been anticipated in most of the medium grade cars, and consequently deliveries of finished cars are running behind because of failure to authorize releases sufficient to meet the demand. Closed car commitments must be made at least 90 days in advance, a prominent maker said, to meet deliveries on schedule. Inability to gauge the extent of the spring closed car business is responsible, to a large extent, for the rush in the body plants.

### No Shortage of Metal Stampings

There is no shortage of metal stampings and products of that character only because the manufacturers in those fields are working two and three shifts a day to keep even with demand. To enumerate plants working under pressure of this kind would mean to call the roll of every plant in the Detroit district.

Wheel makers, particularly those in the disk wheel field, are experiencing a heavy pull to meet which it has been necessary to enter upon overtime and double shift operation. In the frame assembly field there have been some slight delays which have been overcome.

Though it is agreed that the congestion of business could have been avoided by the spreading of orders for supplies over a longer period, it is also agreed that the present extent of the car de-

## RAIL INTERESTS URGE DRASTIC REGULATIONS

ST. LOUIS, April 24—Members of the Traffic Club of St. Louis were advised in an address by Alexander C. Hilton, traffic vice-president of the St. Louis & San Francisco Railroad, to begin a close study of the automobile industry which, he said, is playing havoc with the receipts of the railroads. He suggested the appointment of a national committee of traffic club members to begin a campaign to have enacted more drastic regulations for automobile carriers and to see that those engaged in competition with railroads be forced to pay their share of the tax burden "now largely shouldered by the railroads."

mand could not have been estimated by anyone, parts maker included. It is also evident that, despite the rush of orders, buying on a 30 or 40 day basis will continue to be the rule for some time to come.

## Production in May Will Be Up to April

(Continued from page 932)

that branch of the industry as a whole. Tire plants are increasing their output, and tubes and casings now are being produced at the rate of more than 24,000,000 a year.

So encouraging are conditions that the Ford Motor Co. predicts a production of 1,150,000 cars and trucks in 1922. This would establish a new record for that company.

The only factor delaying full recovery for the automotive industry is lack of complete confidence in the future. Business literally seems "too good to be true." With the lesson of 1920 staring them in the face, many manufacturers cannot believe that prosperity is returning definitely. As a consequence, buying of parts and supplies still is being done on a hand-to-mouth basis, and, except in rare instances, no stocks of cars are being built up. Production is being held rigidly to an actual order basis.

### A.A.A. TO MEET IN ST. LOUIS

WASHINGTON, April 24—The American Automobile Association has decided to hold its annual meeting in St. Louis, May 22 and 23. The invitation was extended by William T. King, president of the St. Louis Automobile Club, who has been appointed chairman of the arrangements committee. King also has been appointed chairman of the committee to report on ways and means of conducting a national fight against automobile thefts.

## Wisconsin Factories Keep Going Forward

**One Body Maker Is at 90 Per  
Cent Capacity—Truck Plant  
Increases Operations**

MILWAUKEE, April 24—Tangible evidence of the improved condition of the automotive industries in all phases in Milwaukee and Wisconsin develops every day. With the motor truck trade again getting into its stride there is added significance to the betterment first discernible in passenger car trade. Progress is being made slowly, but it is substantial. What already has occurred in this direction is strikingly the feature of the current issue of *Business and Financial Comment*, monthly review of local condition, issued by the First Wisconsin National, Milwaukee's largest bank, which says in part:

### Working at Full Capacity

The automotive parts and specialties group (of metal trade industries) expanded operations further during the past month. A firm manufacturing bodies is running 90 per cent of capacity, against 80 per cent a month ago. A motor manufacturing concern augmented its force by 60 men in March. Another motor products firm is operating at full capacity. A firm making switches, motor wheels and other automotive and electrical specialties, reports operations at 85 per cent, and March sales 55 per cent in excess of February sales.

A large motor truck plant increased operations from 28 per cent on March 1 to 48 per cent on April 1. A large rubber tire company had 25 per cent larger sales in March than in February.

Analyzing the agricultural situation, the review says:

First hand information received by this bank from various parts of Wisconsin indicates that the farm sections of this state entered the spring season in fair shape. Opinion is quite uniform that the outlook for the year is good, provided prices remain stable.

It is quite generally felt, however, that most of whatever the farmers make this year will go to pay off their debt. This does not argue increase of farm buying power.

### No Setback with Dealers

One of the most encouraging features of the situation of dealers is that there have been no setbacks in the upward trend of demand for passenger cars, and while the sales curve is still inclined to make peaks and troughs in its day-by-day course, these are less sharp than they have been for many months. There is not a dealer who cannot claim that in the first three weeks in April he moved more cars into owners' hands than in March altogether. April probably will close as the heaviest month in any of the past twenty to twenty-two months.

### A. E. A. SHOW NOV. 13-18

CHICAGO, April 24—The annual show of the Automotive Equipment Association, which will be held at the Coliseum here, Nov. 13-18, will be a closed show, for members of the association only.



## Minnesota Dealers Predict Good Year

**Sales of Cars Will Start as Soon as Roads Are Opened and Season Opens in Country**

MINNEAPOLIS, April 24 — After June 30 what?

This question was put to a number of automotive dealers here, and their answer was: SALES.

The problem as to the automobile business after the second quarter was raised at a dinner given to the automotive dealers by Dunwoody Institute, here. The dinner was planned with a view of getting the dealers better acquainted with the educational work in the automotive mechanical course.

The question of future sales was raised in a talk made by Clyde Jennings, managing editor of *Motor Age*.

F. E. Murphy, publisher of the *Minneapolis Tribune*, a former automobile dealer, the owner of several farms and secretary of the Minneapolis Automobile Trade Association, was one of those who spoke for a full year of automobile prosperity.

### Farmer Is "Good Sportsman"

"Our answer to your question," he said, "is that the Minnesota farmer will buy. He has been hard hit, it is true, but the Northwestern farmer is a good sportsman and is never down. In this connection it must be remembered that only the small grain farmer has been hit, and he is encouraged by the advancing price of grain. But in the Northwest we, also, have the dairy farmer, and in those counties where the monthly 'cream checks' are distributed, prosperity reigns and this district is constantly growing larger. There will be motor equipment of all kinds sold in Minnesota when the season comes in the country. Our good roads program is blazing the way."

The optimism as to car sales was not all at this dinner. Wherever one inquired in Minneapolis, he found the strong belief in the future. It is announced by the city Bureau of State License department that new car licenses are running more than double of a year ago. Exact comparison cannot be made because of the confusion of figures in the changing of the license system, but new car licenses since March 15 have been running from 65 to 140 daily.

This optimism is the more remarkable in the face of present conditions. Spring is very backward and the season is fully three weeks late. This fact is more apparent to the accessory and equipment dealers and jobbers than to the vehicle dealers. The vehicle dealers do not expect much business until the rush of spring work is past.

The equipment jobbers expect a rush of business as soon as the country secondary roads are clear. Last year the jobber salesmen quit the trains the last week of March and took to their motor

## ARRIVAL OF MOTOR TRUCKS FOR MINNESOTA FARMS HAILED BY WHOLE COUNTRYSIDE

MINNEAPOLIS, April 24—The special light truck sales campaign of the International Harvester Co. in which about 5000 of these trucks, popularly called "red babies" have been sold since the first of the year, came to an end April 18 with the delivery that day by the St. Cloud branch of the company of 168 trucks to dealers of Northern Minnesota.

The St. Cloud branch, of which Wells Levens is manager, won first place for selling more of the trucks than any other of the 92 branches of the company. The Boston branch was second; Harrisburg, Pa., third; Denver, fourth; Kansas City, fifth, and Albany, N. Y., sixth.

The delivery of the trucks was marked by a "prosperity day" celebration under the auspices of the Chamber of Commerce.

This celebration was of such general interest to all business men of the state, including the entire automotive trade, that Governor J. A. O. Preus offered himself as one of the speakers in connection with a parade of this machinery.

It was significant in watching the parade of the new trucks that the farmer's buying power has returned.

Dan Wallace, editor of "The Farmer," brother of H. C. Wallace, secretary of agriculture, said:

"The celebration of the return of prosperity will prove of untold value to Minnesota. The eyes of the nation are turned here to-day and the hope of the nation is that the movement inaugurated here will gather momentum to sweep the world. The worst of the slump is ended."

Every farmer in St. Cloud for the celebration was the guest of the local merchants at a picnic luncheon.

This celebration was regarded as such a business stimulant that dealers and branch house managers from central and northwestern Minnesota, Canada, the Dakotas, Montana and Iowa were called in to join in it.

cars. This about trebles their calls and usually brings a rush of business from the small dealers in communities where salesmen do not go during the winter.

The trade in tractors and farm implements has continued better than was expected during the winter. It is said by the men making the best reports that a large share of their sales are going to the dairy counties and the buyers are "factory farmers" who sell cream and fat stock, rather than the usual farm produce.

### Committees of N. A. C. C. Will Draft Road Plan

NEW YORK, April 26—A joint meeting of the motor truck and highways committees of the National Automobile Chamber of Commerce will be held at the Detroit Athletic Club next Tuesday. Members of the two committees will determine a program for presentation to the National Association of Highway Officials for discussion at its coming conference with representatives of the automotive industry.

The purpose of this conference is to map out some uniform plan for the construction of highways to carry motor transport and for the regulation of motor vehicles. Directors of the N. A. C. C. will meet at the Detroit Athletic Club next Wednesday.

### GOODYEAR EXPORT COMPANY

AKRON, April 25—The Goodyear Tire & Rubber Co. has organized an export company with a capitalization of \$10,000. The officers are the same as those of the parent organization. The company was formed to take advantage of the large business which is now opening in foreign fields.

### Stockholders Organizing to Buy Parenti Assets

BUFFALO, April 26—Announcement was made yesterday that a stockholders' protective committee was being organized to raise sufficient capital to buy the assets of the Parenti Motor Corp. fixed at \$400,000, and to obtain sufficient working capital to go on with the production of cars. Plans are expected to be completed within two weeks.

Alfred M. Saperston, attorney for the trustee, the Marine Trust Co., yesterday said all attachments, judgments, executions and suits will be held in abeyance. The attorneys also have agreed to withhold a mortgage foreclosure action on the real property and plant.

Nearly all of the 200 creditors have signed consents in approval of the plan submitted by the trustee. As soon as the bank has decided whether the assets will be liquidated or the stockholders will buy the assets, the trustee will request creditors having liens to withdraw or waive their priority rights. A decision is expected by May 15. William A. McDougal, engineer of the Marine Trust Co., now has charge of the Parenti plant.

### N. A. C. C. Service Managers Will Convene at Detroit

NEW YORK, April 26—The spring convention of service managers of factories members of the N. A. C. C. will be held in Detroit May 16 and 17. The sessions will be at the Statler Hotel, and much the same style of program will be used as proved so successful at the fall meeting in New York.

Two prominent men in the industry, whose names have not been announced as yet, will be the principal speakers.

## Chevrolet Perfects Plan for Flat Rates

### Dealers Will Get It Next Month— Provides for Major and Minor Operations

DETROIT, April 25—The Chevrolet Motor Co. will issue soon after May 1 15,000 copies of its flat service rate to its branches, dealer organizations and independent parts depots. Details of the plan which fixes a fair price on every major operation and most minor operations on both models of Chevrolet cars have been carefully worked out, and dealers will be expected to adhere to it closely.

In issuing the plan the company will not take an arbitrary stand in its enforcement, but will leave it to the dealer's initiative to recognize it as a definite step forward in promoting the interests of the company, the dealer and Chevrolet owners. Developments in the industry have impressed themselves on factory executives as demanding a basis upon which cost of servicing may be predetermined.

#### All Conditions Met

There are from 15 to 18 major operations on the car which are given numbers under the plan, and a large number of minor operations which are lettered. Where major and minor operations combine, these are set forth with the average time required for the work and the cost. Prices on genuine parts which may be installed are to be added to the cost of operations, giving the final costs.

Major operations are considered as those which require the removal of a major part, and minor operations those which are readily accessible. Minor operations which can be performed only by the removal of major parts assume the costs of both. In all cases the varying conditions which may be met in performing the work have been considered in fixing the time charge.

In a prelude to the plan it is set forth that the varying times fixed take into consideration the use of tools of certain general types which dealers will be expected to have included in their shop equipment. Where dealers expect to base their charges as outlined in the plan, it will be necessary for them to have similar tools.

#### Building Up Parts Depots

With the promulgation of the fixed rate service plan Chevrolet is building up through its dealer organizations a system of parts depots in independent garages located in strategic points throughout the country. These parts depots will be authorized as Chevrolet parts depots and will carry supplies of parts bought through the dealers at a fixed discount.

#### NEW NOBLE TRUCK

KENDALLVILLE, IND., April 22—The Noble Motor Truck Corp., this city,

has brought out a new 1½-ton model that lists at \$1,840 complete. This job will take an 18-passenger bus body on a standard 130-in. wheelbase.

Specifications include a Buda 3½ by 5½-in. powerplant, Eisemann ignition, Stromberg carburetor, Long radiator, Fuller clutch and gearset, Blood Brothers driveshaft, Sheldon front and rear axles and a Sharon frame. Other equipment includes indestructible steel disk wheels mounted with 34 by 5-in. Miller cord tires, Stewart-Warner vacuum fuel feed, electric starting and lighting and Alemite chassis lubrication.

### April May Establish Records for Industry

NEW YORK, April 26—There is a strong possibility that April production of motor vehicles will be the largest of any single month in the history of the industry. It is certain to be the largest in respect to carload shipments. The total of carload shipments for all manufacturers in March was 27,380, and there is every indication that this record will be exceeded by 25 per cent this month. If production does not establish a new high mark this month, it will be because of the enormous number of driveaways in some of the months of 1920, when there was an acute shortage of freight cars.

### New Lexington Phaeton Is \$240 Lower Than Old

CONNEERSVILLE, IND., April 24—The Lexington Motors Co. has a series 22, 5-passenger phaeton, priced at \$1,745, which is \$240 less than the lowest previous price on a Lexington fitted with Ansted engine. In this series the Ansted engine has been refined and improved in many respects.

There is a new type, two ring piston, which is specially designed to prevent oil pumping and slapping. A thermostat is used to control the cooling system. The frame has a double triangular center cross member, and the front and rear cross members have been strengthened by deepening the gusset plates. Both front and rear springs have boots laced around them to retain lubricant and keep out mud and water. The other features of the car are essentially the same as in previous models.

#### G. M. OFFICERS RE-ELECTED

NEW YORK, April 26—At its annual organization meeting, the board of directors of the General Motors Corp. re-elected all officers for the coming year. Membership on the finance committee was increased from 10 to 11 by the addition of Alfred P. Sloan, Jr., vice-president in charge of operation.

#### SIZER TO GET HAMMOND STEEL

BUFFALO, April 25—The Sizer Forge Co. of Buffalo will soon take over the management of the Hammond Steel Co. of Syracuse, which is at present being reorganized.

## Car Exports Double March of Last Year

### Shipments Were 4,471 Last Month Against 2,019 in 1921 and 3,096 in February of 1922

WASHINGTON, April 26—The international trade revival brought about large shipments of American automotive vehicles and equipment during March. This is strikingly shown by the export totals for that month, as announced today by the Bureau of Foreign and Domestic Commerce. The shipments totalled 4471 passenger cars, valued at \$3,831,432; 590 motor trucks valued at \$554,292 and parts, not including engines and tires, to a total of \$3,596,539. The tire shipments for the month were \$2,201,349.

The large gains made over the preceding month of February and a comparison with March, 1921, are indicated as follows:

	Passenger cars	Motor Trucks	Parts
	3096	454	
February, 1922	\$2,556,555	\$391,738	\$2,840,259
2019	610		
March, 1921	\$2,348,378	\$877,781	\$3,098,535

The tire shipments in February totalled \$1,203,555. The upswing in export sales that began some months ago thus was continued through March at a total generally larger than any previous month since the latter part of 1920 or early 1921. The figures announced by the Commerce Department are only for shipments made from the United States and do not include the large volume now going from the Canadian factories.

### G. M. Shipped 2239 Cars from Canada in March

NEW YORK, April 26—The overseas shipment of 2239 passenger cars from its Canadian factory during the month of March was announced here to-day by General Motors Export Corp., following the release from Washington of the export shipments of automobiles from the United States during that month. These Canadian totals do not show on the Washington figures. They compare with an approximate 1350 cars shipped by General Motors from Canada in February.

Of the March exports, General Motors shipped 1017 cars to its subsidiary corporation in the United Kingdom. To other parts of the world the totals were 1222. The increases over February were approximately 500 cars to the United Kingdom and approximately 400 to the rest of the world.

D. A. Laing, sales manager of the export company, says:

Our March shipments went to practically all territories. The Australasian division was first in number of cars shipped, with the Pan-American second and the European third. Australia and Argentina continued to take heavy orders and the decreased activity in Europe discloses the steady improvement being made in getting the Continent back to a more normal basis.



## May Put Motor Cars On Big Four Branch

### Officials Confer at Springfield— Plants in That City Increase Production

SPRINGFIELD, OHIO, April 25—Motor equipped trains may be operated on the Delaware division of the Big Four railroad within the next few months. This developed as a result of a conference between Superintendent Philip T. White of the Cincinnati-Sandusky division of the Big Four railroad, General Manager E. O. McDonnell of the Kelly-Springfield Motor Truck Co. and W. J. Foster, chief engineer for the Edwards Railway Motor Car Co. of Sanford, N. C.

The proposition was taken up a few days ago with Vice-President H. A. Worcester of the Big Four system, with headquarters in Cincinnati. It is understood that Superintendent White is favorably impressed with the proposition.

The Kelly-Springfield company is making a special drive for municipal business. During the past week it booked an order for four heavy unit Kelly trucks from the City of Milwaukee.

The Springfield works of The International Harvester Co. is keeping up its schedule of fifty light speed trucks daily. Superintendent Charles H. Smart states that orders are increasing and that foreign business is picking up.

The Westcott Motor Car Co. is rushing manufacture. The company is building all the cars it can with the limited amount of material available. The officers of the company say that April will be the best month in the past two years and that May promises to be even better. There were numerous shipments and drive-aways during the past week.

Business is improving at the plant of the Victor Rubber Co. Good sized shipments are being made, and the plant is being operated full time five days a week.

## Mexico City Show Ends After Successful Week

NEW YORK, April 25—Successful sales of all classes of automotive equipment attended the annual motor show in Mexico City. Held under the auspices of the automotive division of the American Chamber of Commerce as a co-operative venture among the dealers in the Mexican capital, the exposition opened on April 16, and when the doors were closed after the week of exhibition, a total of 152 passenger cars, five trucks and ten tractors had been sold, with equipment and accessories to a total value of 800,000 pesos (\$400,000).

These results were announced in a cablegram from the Chamber of Commerce at Mexico City to *El Automovil Americano*, the Spanish automotive publication of the Class Journal Co. The cable states:

American Chamber of Commerce automobile show opened without hitch despite diffi-

culties as the three days before the opening were national holidays. The National Theater, in which the exhibition was held, was specially decorated and had a pleasing appearance. Music throughout the week was furnished by a government band. Total attendance for the week was 6,900, the best day being the closing Sunday when the visitors numbered 1350.

The total sales were 62 low-priced cars, 64 of the medium price class and 26 of the high priced class. Five trucks and ten tractors were sold. Eighteen passenger cars, two truck and four tractor lines were shown. The actual business done during the show was 800,000 pesos, with many prospects not yet closed.

Dealers say the show this year was better than that of last year and are surprised at the results. President Obregon attended on Saturday morning.

## Moline Plow Reorganizes As Virginia Corporation

RICHMOND, VA., April 26—The Moline Plow Co., Inc., has been incorporated under the laws of Virginia as a reorganization of the Illinois company. It has an authorized capital of \$20,000,000 in preferred and 200,000 shares of common.

The Moline Plow Co., which is controlled by the Willys-Overland company through the ownership of 82 per cent of the common stock, was incorporated in Illinois in 1870 and was gradually expanded until it became one of the largest producers of agricultural implements, wagons, trucks, tractors and sleighs. Control passed to the Willys-Overland company in September, 1918, when it acquired the Stephens interest. The company encountered financial difficulties because of the financial depression, and the reorganization plan has been worked out by committees representing all classes of creditors and stockholders. The reincorporation came almost simultaneously with the acceptance by Willys-Overland stockholders of the reorganization plan.

## U. S. Chamber to Discuss Highway Transportation

NEW YORK, April 26—Tentative approval has been given by the Chamber of Commerce of the United States to a group meeting for the discussion of highway transport at its annual convention in Washington in May. A. J. Brosseau, president of Mack Trucks, Inc., has been named as chairman of the division. Prominent speakers will discuss the economic foundation of highway transport, regulation, state programs and other relevant subjects.

The national counsellors of the chamber will meet May 15, the day preceding the opening of the convention, to act upon nominations for the board of directors. Among those nominated is W. O. Rutherford, vice-president of the B. F. Goodrich Co.

The United States Chamber of Commerce has received and has approved the discussion of resolutions on taxation, highway transport and anti-dumping which have been submitted by the National Automobile Chamber of Commerce.

## New York Expects Good Summer Trade

### April Will Exceed March, Which Was Record Month—Deliveries Heavy

NEW YORK, April 27—There is no doubt that passenger car sales in the metropolitan district, when finally tallied for April, will exceed the March record, which was the largest since the spring of 1920. May business also is bound to be good, and the most conservative distributors look for a continuance of spring sales conditions up to the end of June. They hardly expect May to be as big a selling month as April, and they look for a logical seasonal falling off in June. Early indications are for a normal summer business, with the prospects for fall dependent upon the general trend of business.

Sales records of one or two of the most popular cars will probably fall off a little in April from what they were in March. This condition is due to inability to make immediate deliveries, particularly of closed cars. Buyers in March, in most cases, were willing to wait for April delivery, but a good many April buyers showed a decided disinclination to wait until May for their cars.

### Gain in Deliveries Big

Deliveries in April have been heavy, virtually all dealers running 25 per cent ahead of March and others 40 per cent more. The new car registration report for April will show a big gain over March.

In New York City April buying has lacked the "snap" which prevailed in March. March was an exceptionally mild month, and the urge to get out in the open sent thousands of people to the salesrooms eager to obtain new cars. April weather has been cold and generally wet, and buying has been built more on sales activities of the metropolitan staffs than on the spontaneous desire of buyers. Outside New York City itself, however, March did not show any such momentum.

## Wizard Automobile Co. Assets Sold for \$105,500

CHARLOTTE, N. C., April 25—The final chapter in the career of the Wizard Automobile Co. was written yesterday when the entire assets of that company were sold by J. Lee Phillips to the Automatic Car Step Co. for \$105,500. The Wizard company was organized for the purpose of manufacturing the Wizard Junior automobile, to sell for \$395.

The sale was made subject to a higher bid within thirty days. The assets include one large building, several smaller ones and all the accessory machinery used in the manufacture of the automobiles, and 92 acres of land. All of the buildings are of the most modern type of construction.

## Masetti in Mercedes Wins Sicilian Contest

**Averages 39.2 Miles an Hour and  
Beats the Record He Made  
Last Year**

PALERMO, SICILY, April 4 (*by mail*)—Driving a 300 cubic inch racing Mercedes of 1914 design with modern refinements, Count Masetti, an Italian amateur, won the thirteenth Targa Florio race 'round the island of Sicily. He averaged 39.2 miles an hour for the 269 miles of the race, beating his own record of a year ago, when he won this race on a Fiat, by 34 min. 15 sec.

There was unusual competition this year, for in addition to Count Masetti's German Mercedes, the Mercedes company of Stuttgart sent six other cars driven by their best professionals. Ballot put in a couple of machines with Goux and Foresti as drivers, Fiat had four cars, Austro-Daimler four, and others were Itala, Alfa-Romeo and Ceirano, making a total of 44 starters. Of these 26 finished.

### Supercharger Appears in Races

Much technical interest attached to the entries, for several of them were new racers which will be seen in the European events. For the first time in Europe a supercharger was used on two six cylinder Mercedes cars of 4.1 by 5.5 ins. bore and stroke, driven by Sailer and Werner, and by two new four cylinder Mercedes cars of 2.5 by 4.4 handled by Minoia and Scheef. It was difficult to judge the value of the Mercedes supercharger in the race for the reason that, owing to the nature of the course, it was not possible to keep the charger in operation for more than a portion of the time.

All four cars with superchargers were stated to be stock models, of a high speed sporting type. The small ones are entirely new and will be used by Mercedes in the various races to be held in Europe this season. Cylinder construction is steel, with a common water jacket for the four cylinders. There are four valves per cylinder with a couple of overhead camshafts, the drive for which is by vertical shaft and bevel gearing at the rear. The compressor is at the front, driven off the crankshaft. These little racing cars have shaft drive and cantilever rear springs, the rear portion of the spring being much shorter than the forward portion. Front wheel brakes are fitted.

### Fiat to Produce Racing Car

Fiat's best machine in the race was the four cylinder 91 cubic inch model, driven by Giacconi. This car is going into production on a small scale as a special high speed sporting type. The little engine of 2.5 by 4.4 ins. bore and stroke develops better than 65 hp. at 5000 revolutions and has steel cylinders with a common welded-on water jacket for the group. Two valves per cylinder

are employed with a couple of overhead camshafts operating the cams through a light follower. A feature of the engine is the use of roller bearings for every part except the wrist pins. Crank case is dry, all the oil being fed from a dash-board tank and returned to this tank by a scavenging pump.

Austro-Daimler competed with the smallest cars, four cylinder models of only 2.7 by 2.9 ins. bore and stroke, having a piston displacement inside 67 inches. The engines have aluminum cylinders with steel liners, a detachable head and two overhead valves per cylinder. Camshaft drive is from the front end, by a vertical shaft and bevel gearing, with the electric generator on the shaft itself. These little cars have rear cantilever springs and front wheel brakes. One of the features of the race was the use of brakes on the front wheels by practically everybody.

## FINANCIAL NOTES

Stewart Warner Speedometer Corp. has declared a quarterly dividend of 75 cents a share on its stock, payable on May 15 to stockholders of record April 29, thus increasing the annual rate from \$2 to \$3 a share. The corporation paid 6 per cent in dividends 1917 and 1918, 9 per cent in 1919, 4 per cent in 1920 and the rate was further reduced on May 15, 1921 to 50 cents a share quarterly, at which payments were maintained until the present increase. Net profits of the corporation for the first quarter of 1922, not including income taxes, were \$516,000 against \$51,000 for the corresponding period last year.

Curtiss Aeroplane & Motor Corp. for 1921 reports gross profits on sales of \$578,118, and net profits, after all selling expenses and subsidiary company losses, of \$277,466. After allowing for interest charges, depreciation, etc., there was a net surplus for the year of \$101,207. The balance sheet at the close of the year showed a profit and loss deficit of \$1,158,924.

Pierce-Arrow Motor Car Co. for the first three months of 1922 shows an operating income after expenses of \$290,075, against a loss of \$160,193 in the same period of 1921. Deficit after taxes was \$25,226, as compared with a deficit of \$489,501 in the same period of 1921.

Republic Rubber Corp. showed its first net profit under C. H. Booth, the receiver, in March. After interest and all charges, the net was \$27,000. Shipments for the month were \$475,000. Based on gains to date, it is expected they will approximate \$550,000 in April.

Lee Tire & Rubber Co. has declared a regular quarterly dividend of 50 cents a share on capital stock, payable June 1 to stock of record May 15.

### FRENCH GET BRITISH LICENSE

BRISTOL, ENGLAND, April 12 (*by mail*)—The Bristol Aeroplane Co., Ltd., has granted the sole license to manufacture in France the 400 horsepower Bristol Jupiter radial air-cooled aero engine to the Gnome & LeRhône Engine Co. This is said to be the first time the manufacturing license for an airplane engine of British design ever has been acquired by a French manufacturer.

## BANK CREDITS

*Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co., second largest bank in America.*

During the last week the local money market was decidedly easy. Call money practically ruled at  $3\frac{1}{2}$  per cent for the whole week, the range being from  $3\frac{1}{2}$  per cent to 4 per cent, as compared with a range of 4 per cent to  $4\frac{1}{2}$  per cent in the previous week. On Monday renewals were put through at 4 per cent, while a flat rate of  $3\frac{1}{2}$  per cent was quoted for the rest of the week. In time money the situation in general was quiet, although funds were in large supply. Toward the end of the week all periods from 60 days to 5 months were quoted at  $4\frac{1}{4}$  per cent with 6 months at  $4\frac{1}{4}$  per cent to  $4\frac{1}{2}$  per cent, as compared with  $4\frac{1}{2}$  per cent in the previous week for all maturities. The prime commercial rate was down to  $4\frac{1}{2}$  per cent, as compared with a range of  $4\frac{1}{2}$  per cent to 4% per cent in the previous week.

The Federal Reserve statement as of April 19 showed increases of \$5,185,000 in gold reserves and \$7,642,000 in total reserves. Bills on hand declined \$27,041,000 and total earning assets showed a shrinkage of \$7,866,000. Total deposits increased \$49,829,000, while Federal Reserve notes in circulation decreased \$19,215,000. The reserve ratio declined from 77.7 per cent to 77.3 per cent.

It appears that the coal strike now in its third week is having greater influence upon iron and steel conditions than was at first anticipated in some quarters. Although the rate of output is not greatly reduced, rising prices for pig iron and stiffening markets for steel are noted. The demand appears to be stimulated by less confidence in the adequacy of the fuel supply on hand.

According to reports filed with the Interstate Commerce Commission, the Class I railroads showed a net operating income for February of more than \$47,000,000, as compared with a net operating income of over \$29,000,000 in January and with an operating deficit of over \$5,000,000 in February, 1921. The net operating income for February, 1922, represents earnings at an annual rate of 4.57 per cent on the tentative valuation of the roads as fixed by the Interstate Commerce Commission. The income falls short by \$14,884,000 of the amount necessary to give an annual rate of return of 6 per cent.

### JOHN LAUSON DIES

MILWAUKEE, April 21—John Lauson, founder and president of the John Lauson Manufacturing Co., New Holstein, Wis., a large manufacturer of gas engines and power farming equipment, died at Milwaukee Hospital following an operation. He was 54 years of age and established the nucleus of the present business when he was 19 years of age by opening a small machine shop to make gas engines and do repair work. Lauson designed the Lauson tractor.



## INDUSTRIAL NOTES

**Hayes Pump & Planter Co.** control under the completed refinancing plans has been returned to the directors, newly elected. Officers of the company now are E. L. Yocum, president; R. W. E. Hayes, vice-president and secretary; A. L. Hayes, vice-president; F. H. Hand, treasurer and general manager; W. L. Jacoby, Chicago, president of the Mitchell Motors Co., Racine, Wis., is also member of the directorate. E. M. Kerwin has been controller of the company during the year, since creditors assumed management. The company is located at Galva, Ill.

**Bingham Manufacturing Co.**, Columbus, has been organized with the election of H. N. Bingham, president and general manager; F. E. Kocher, vice-president and G. P. Hinkle, secretary. The company will manufacture rear transmission systems for motor trucks, assemble motor trucks and manufacture special bodies for trucks. The company recently acquired the property in this city of the Immet Co., and has come into possession of a plant at Hamilton, Ont., to manufacture for the Canadian trade, this latter company being known as the Triumph Motor Equipment Co.

**Four Drive Tractors, Ltd.**, has bought the Four Drive Tractor Co., Big Rapids, Mich., and while it intends to continue the present size of tractor this year it plans to bring out two new sizes for 1923 trade. To take care of the new models, the plant facilities will be greatly increased. The new firm is a close concern with no outstanding stock or other obligations and is composed of A. V. Van Horn, manager; Emmet Deady, chief engineer; Henry Polaski, assistant manager; Arthur Martz, treasurer and Leon D. Williams, cashier.

**Knox Tire & Rubber Co.** at its reorganization meeting elected Judge F. O. Levering of Mt. Vernon, Ohio, president; Harker M. Lybarger, Mt. Vernon, first vice-president; J. O. Robson, Barton, Ohio, second vice-president and sales manager; F. D. Spenceer of Mt. Vernon, secretary and George H. Jones of Mt. Vernon, treasurer. They constitute the board of directors together with C. F. Vandervert, J. P. Robson, George W. Ball, W. E. Johnson, G. L. Stephan, M. G. Spencer and Ezra Turner.

**Wayne Oil Tank & Pump Co.**, Fort Wayne, Ind., announces the change of its name to **Wayne Tank & Pump Co.** The change was found advisable in view of the recent purchase of the Borromite Co. of America by the Wayne Oil Tank & Pump Co. The Borromite Co. formerly controlled the patent rights and sold Borromite water softening systems. These will be marketed hereafter under the name Wayne Water Softening Systems.

**Six Wheel Truck Co.**, Fox Lake, Wis., will relocate in Waupun, Wis., local capital having assured a sufficient absorption of the stock and made provision for factory quarters so that quantity production may be started without delay. F. N. Pettegrew, president, and D. G. Strobel, sales manager, are moving their headquarters to Waupun and only a few details remain to be arranged to bring about the actual removal of the present plant.

**Halliday Motors Co.** has been appraised at \$103,000 by J. M. Spillman, B. L. Montgomery and M. J. Reese, appraisers in the suit brought against the company by the Barber Asphalt Co. The appraisal covers property in Seneca, Muskingum and Hocking counties, mostly real estate, and personal

property in Licking county. A supplementary appraisal is recommended.

**Sandow Motor Truck Co.** assets have been sold at auction in Chicago by the trustee. The property was purchased by various bidders, the good will and some of the machinery going to the Glant Truck Co. of Chicago Heights, Ill. The sale was for the purpose of liquidating the Sandow company and the trustee estimated that creditors would receive about 50 cent on the dollar.

**Trumbull Tire & Rubber Co.**, plant at Newton Falls, Ohio, has been sold to the Union Savings & Trust Co. of Warren for \$130,000. The sale came as the result of a suit started in 1920 by the Stambaugh Co. of Youngstown whose officials claimed they had completed the plant at a cost of \$125,000 and part of this was unpaid.

**Driver - Harris Co.**, manufacturer of Nichrome products with a plant at Harrison, N. J., announces that beginning May 1 its Chicago branch will occupy enlarged quarters at 562-574 West Randolph Street, that city. The facilities heretofore offered have been inadequate for its rapidly growing business in the Mid-West.

**Canton Rim Co.** has bought the property of the F. R. Fortune Tool Co. at Wooster, Ohio, for \$25,300. Of this \$13,000 was cash and the balance in preferred stock. The company will begin operations within sixty days and at the start will employ 25 to 30 men.

**John E. Moore**, general sales manager, and **William A. Kent**, eastern sales manager of the Hincley-Myers Co., Jackson, manufacturers of complete garage and service equipment, have opened an eastern sales and executive office in the General Motors Building, Detroit.

**Ralph Root** has purchased the assets of the Worcester Abrasive Co., New York, manufacturer of "pep" water mixed valve grinding compound and has organized the Pep Manufacturing Co., with offices at 33 West Forty-second Street, New York.

**International Harvester Co.** shipped from Jan. 1 to April 1 a total of 1,651 carloads of trucks from its factories at Akron and Springfield, Ohio. Of the total, 892 carloads were shipped west of the Mississippi river and 759 east of the Mississippi river.

**Traylor Engineering & Manufacturing Co.** first mortgage 8 per cent sinking fund bonds due June 1, 1936, to the amount of \$800,000 are being offered through H. D. Robbins & Co., New York, at 101 and interest.

**United States Rubber Co.** branch at Kansas City will become the largest of the 43 American branches of the company through the acquisition of a lease on an eight story building in that city.

New Engine for Airplane  
Still Under Development

WASHINGTON, April 24—The National Advisory Committee for Aeronautics, an independent bureau of the Government doing research on motor construction, has been informed of the progress made in developing the semi-Diesel airplane engine, on which the committee has been working for some time. Until the engine is fully developed and all plans have been completed, none of the specifications will be given out, Chairman Charles D. Walcott has announced.

The possibilities of an airplane engine, so constructed that it will run on a distillate, thus obviating the greater amount of danger from airplane fires, it was stated, are extremely favorable and will eventually be a reality.

## METAL MARKETS

**BOTH** the pig iron and steel markets have responded with alacrity to the pranks and capers of frightened buyers, some of whom have apparently become so scared that they are placing orders without even mentioning the subject of prices. Thanks to the abject fear of the nervous contingent that they might be caught without sufficient supplies to satisfy their requirements the iron and steel markets have turned from the easy position they were in a few weeks ago into a strictly sellers' affair. There was a meeting of independent steel interests in New York a few days ago. Of course, no one knows what took place at this meeting, but the very fact that such a meeting was held proves the return of sunshine where a few months ago there were only great globs of gloom.

Youngstown sheet producers let it be understood that they doubt whether consumers will be given an opportunity to cover their requirements at prevailing levels should a further advance in sheet prices be generally decided upon. This advance is already in the making. Some of the mills mention 3.30@3.40c for black and 4.30@4.40c. for galvanized as asking prices on new business. They have not yet booked any business at these prices, which imply an advance of \$3@\$5 a ton, but there is no telling what may come to pass in a market such as the present one.

Full-finished automobile sheets are quoted at 4.50c. It is only natural that, with the production of most sheet mills engaged up to June 30 at prices \$6 a ton below what many producers believe they could obtain to-day, there is no eagerness for orders for the third quarter deliveries. In spite of all the nervousness which many smaller consumers manifest, there is very little danger of runaway market conditions. In the first place, large buyers are looking upon recent developments in the iron and steel markets with considerable equanimity. They have covered their requirements for the current quarter and can afford to assume a waiting attitude. In the second place, the chief steel producing interest's policy has never been more conservative. It aims at the building up of a sound backlog of orders at present prices and a stabilization of the market. The independents can go just so far in the matter of prices and no further.

**Pig Iron.**—More and more furnaces are going into blast. Prices are \$2 higher than they were a month ago. A further price flurry is not precluded, but with increased production and a sane attitude on the part of buyers it should be short-lived, especially if the coal strike is settled in the near future.

**Steel.**—Automotive consumers have placed orders (in some instances for as much as 1000 tons) for hot- and cold-rolled strip steel, with the result that many producers are reluctant to commit themselves beyond the present quarter. Cold-rolled is steady at 3.65c. and hot-rolled at 2c., Pittsburgh. Prices for nuts and bolts have been revised upwards. For sheet bars as high as \$35 is asked, although in some instances business for deferred shipment has been placed at \$31@\$32.

**Aluminum.**—Market has turned stronger and it takes some combing to uncover 98 to 99 per cent pure virgin ingots at below 18¢. Automotive consumers are in some instances specifying on contracts ahead of the maturing of deliveries.

**Copper.**—The market for ingot metal is of a lackadaisical character. The leading rolling mills interest has reduced all copper products, with the exception of wire and wire rods, 1c. per lb., and all brass and bronze products ½c. a lb.

# Calendar

## SHOWS

Nov. 13-18—Chicago, Annual Show and Meeting of the Automotive Equipment Association.

## FOREIGN SHOWS

March 10-July 31—Tokio, Japan, Peace Exhibition.  
April 22-May 1—Prague, Czechoslovakia, Fourteenth International Automobile Exhibition.  
May—Shanghai, Exhibition of Road Building Material.  
May, 1922—Quito, Ecuador, Agricultural Exposition, celebrating Centenary of Ecuador. Automotive Section.  
May 1-15—The Hague, Automobile Show, also Airplanes and Motorboats. Secretary, Spui 185, The Hague.  
May 6-21—Scheveningen, Automobile Show.  
May 24-June 5—Barcelona, Spain, Automobile Show under Dealers' Direction.  
May. 28-June 5—Prague, Motor Show. Hotel de Ville.  
July 1-24—London (Olympia). Aircraft Exhibition.

Sept. 1922—Rio de Janeiro, Brazil, Automobile exhibits in connection with the Brazilian Centenary Association Automobillista Brasileira.

Sept. 15-20—The Hague, Automobile Show.

September—Buenos Aires, Argentina, Annual Exhibition, Sociedad Rural Argentina.

Oct. 4-15—Paris, Automobile Show, Grand Palais.

Oct. 12-23—London (Olympia). International Commercial Vehicle Exhibition.

Nov. 3-11—London (Olympia). Automobile Show.

Nov. 10-Dec. 19—Brussels, Automobile Show, Palais de la Cinquantenaire.

Nov. 29-Dec. 4—London (Olympia). Cycle and Motorcycle Show. British Cycle Motors, The Tower, Warwick Road, Coventry.

November—Buenos Aires, Argentina, Annual Exhibition, Automovil Club Argentino.

## RACES

May 31—Indianapolis International Sweepstakes.

## CONVENTIONS

May 8-10—New York, National Association of Manufacturers.

May 10-12—Philadelphia, Ninth National Foreign Trade Convention of the National Foreign Trade Council.

May 12—New York, Annual Meeting, National Highway Traffic Association, at the Automobile Club of America.

May 16-17—Detroit, Semi-Annual Convention, Factory Service Managers, National Automobile Chamber of Commerce, Hotel Statler.

May 16-18—Washington, D. C., Annual Meeting of the Chamber of Commerce of the United States.

May 22-23—St. Louis, Annual Meeting of the American Automobile Association.

May 22-25—New York, Palisades Interstate Park, Second National Conference on State Parks, Bear Mountain Inn.

June 11-15—Milwaukee, Annual International Convention

of the Associated Advertising Clubs of the World.

June 19-20—Detroit, Summer Convention of the Automobile Body Builders Association.

June 19-24—Colorado Springs, Summer Meeting, Automotive Equipment Association.

June 26-July 1—Atlantic City, Twenty-fifth Annual Meeting of the American Society for Testing Materials, Chalfonte-Haddon Hall Hotel.

August 28 - Sept. 2—Detroit, National Safety Congress.

Sept. 18-23, 1922—Rome, Italy, Second Annual Meeting of the International Chamber of Commerce.

## S. A. E. MEETINGS

June 20-24—White Sulphur Springs, W. Va., 1922 Summer meeting of Society of Automotive Engineers.

Indianapolis, May 8; Chicago, May 12; Detroit, May 19. The Pennsylvania section will hold an outing at Torresdale or a body meeting on May 25.

## Reo Selects Windsor for Canadian Plant

DETROIT, April 25—The Reo Motor Car Co. has taken over the plant of the Swedish Crucible Steel Corp. in Windsor and will locate its Canadian manufacturing branch there. The work of moving equipment from the former St. Catharines plant is now under way; D. B. McCoy, former advertising manager of the company, has been appointed manager of the Canadian branch.

The plant will be used exclusively for production of Reo cars and speed-wagons for the Canadian trade, the general export business of the company to be continued from the Lansing plant. Assembling of vehicles will be under way within 90 days, and it is expected to reach a production, with facilities to be added, of 15 to 20 daily.

The St. Catharines plant of the company has not been in operation for about four years. Some time ago it was determined to move the Canadian branch to Windsor as the logical site for motor car manufacturing in that country. Plans were held up pending the acquisition of suitable buildings. The Canadian offices of the company will be located in Windsor after May 1.

## Factories in Detroit Short of Skilled Labor

DETROIT, April 24—Increased production in automotive plants has absorbed practically the entire supply of skilled labor in this district. Some factories are having difficulty in obtaining common labor. An actual shortage of skilled workmen is reported in body plants. Many advertisements for wood working, machine and other skilled op-

eratives are being carried by Detroit newspapers.

An increase of 4500 men on the payrolls of members of the Employers Association was reported last week, bringing the total to 145,234, or within 50,000 of the peak in 1920.

## TRACTOR PRICES REVISED

NEW YORK, April 24—Price revisions have been announced by the different manufacturing companies on the following tractors:

	Old Price	New Price
Helder C .....	\$900	\$995
Townsend, 10-20 .....	750	800
Fitch .....	...	1,850
Mohawk .....	785	650
T. B. ....	715	500
International, 15-30 .....	1,500	1,750
Reliable, 10-20 .....	865	390

## SMALLER TRACTORS SELLING

LOS ANGELES, April 22—Tractor dealers in Los Angeles and other cities in Southern California report that there has been a satisfactory movement of the small, lower-priced lines this spring.

## DIAMOND NAME PROTECTOR

WASHINGTON, April 27—The Federal Trade Commission has issued an order prohibiting the Diamond Holdfast Rubber Co. of Atlanta from using the word "Diamond" in connection with the rubber business as this word has been established in the rubber trade by the Diamond Rubber Co. of Akron, Ohio, which began its use in 1898. The commission's order not only prohibits the Atlanta company from using the word "Diamond" but also from the use of the figure of the diamond or any symbol or mark likely to be confused with it.

## Dominion Steel Elects Jones Head

DETROIT, April 26—Harry Ross Jones, president of the United Alloy Steel Corp., Canton, Ohio, has been elected chairman of the board of directors of the New Dominion Alloy Steel Corp. W. B. Boyd of Toronto was made president and George A. Simpson of Hamilton and B. H. McCreath of Toronto were elected vice-presidents.

A large site fronting on the St. Claire River in the south end of Sarnia has been ceded to the company by the Canadian government. Construction of a plant is expected to be started in six weeks. The first unit will probably be in operation in twelve months.

The company will specialize in production of hardened automobile steel, of which about \$5,000,000 worth is imported into Canada annually. The company is to have an authorized capital stock of \$15,000,000. Five million dollars will be subscribed for the commencement of operations. Arrangements are reported to have been made with bankers to underwrite the stock issue.

## Kelsey Wheel to Make Bodies for New Gray

DETROIT, April 26—The Kelsey Wheel Co., Inc., will make the bodies for the new Gray motor cars, in both open and closed models. Until within the past year, Kelsey was a big producer of Ford bodies, having a capacity for over 1000 bodies daily. This work was discontinued with the opening by the Ford company of its own body making plant.

First bodies for the Gray line are now under construction in the Kirby Avenue plant of the Kelsey company.